CHEMISTS
ENGINEERS

BADGER LABORATORIES & ENGINEERING INC.
501 WEST BELL STREET • NEENAH, WISCONSIN 54956-4868 • EST. 1966
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June 3, 2006
P.O. # TW354

Mr. Robbie Sage
Atlas Resin Proppants
P.O. Box 100
Taylor, WI 54659

Dear Mr. Sage:

Enclosed are four copies of the report detailing the Particulate, Volatile Organic Compound (VOC) and Phenol emission tests run May 4, 2006 at the facility in Taylor, WI. The average results from the testing are shown below.

Parameter	**Results**	**Limitation**
Particulate	1.17 lbs./hr	1.50 lbs./hr
VOC, as Propane	2.38 lbs./hr	10.6 lbs./hr
Phenol*	54.5% DE	64% DE

* Average results from runs two and three. Run one not used due to an apparent problem with one of the inlet samples.
DE = Destruction Efficiency

If you have any questions regarding the report, please call. Thank you for allowing us to provide this service to you.

BADGER LABORATORIES & ENGINEERING
WDNR Certified Lab #445023150

Bruce F. Lamers

Bruce F. Lamers
Project Manager

Enclosures

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ATLAS RESIN PROPPANTS
Process Emission Tests
at

Taylor, WI
May 4, 2006
P.O. #TW354

Prepared by:

BADGER LABORATORIES & ENGINEERING
501 W Bell Street
Neenah, WI 54956

June 3, 2006

Stephen C. Taylor
Chief Chemist

Bruce F. Lamers
Project Manager

Table of Contents

Atlas Resin Proppants - Process Emission Test

I. Introduction and Summary

Badger Laboratories & Engineering Co., Inc. (BL&E) was retained by Atlas Resin Proppants to determine the emission rate of Particulate, Volatile Organic Compounds (VOC) and Phenol from the discharge of a sand resin coating process (P51). The facility is located at off County Road P, north of Taylor, WI in Jackson County. A wet scrubber is used for emission control.

Emission tests were conducted May 4, 2006 by Bruce Lamers and Matt Vissers of BL&E, (phone No. 920-729-1100). The testing was performed to demonstrate compliance with limitations listed in Wisconsin Department of Natural Resources (WDNR) Air Pollution Control Construction Permit No. 05-JAJ-015. No representative from the WDNR was present to witness the testing. Testing was performed following U.S. EPA and NIOSH Methods. Mr. Robbie Sage is the Atlas Resin Proppants contact, (phone No. 715-662-2200). Summaries of the test results are shown below. A more detailed breakdown of the results is contained on the next page and in the Appendix.

Emission Results

5/4/06

Parameter	Results	Limitation
Particulate	1.17 lbs/hr	1.50 lbs/hr
VOC, as Propane	2.38 lbs/hr	10.6 lbs/hr
Phenol*	54.5% DE	64% DE

* Average result from runs two and three. Run one not used due to an apparent problem with one of the inlet samples. See Comments on next page.

DE = Destruction Efficiency

Particulate & VOC Emission Results

Test Run	Volumetric Flow Rate, dscfm	Isokinetic Ratio, %	Particulate lbs/hr	VOC, as Propane lbs/hr
1	4,425	97.3	1.056	**2.19**
2	4,416	99.3	1.296	**2.48**
3	4,337	99.5	1.160	**2.48**
Average	**4,393**		**1.17**	**2.38**
Limitation			1.5	10.6

Phenol Destruction Efficiency

Test Run	Inlet Phenol Emission Rate, lb/hr	Outlet Phenol Emission Rate, lb/hr	Destruction Efficiency
1	0.026*	1.317	**-%**
2	3.102	1.565	**49.6%**
3	4.066	1.693	**58.4%**
Average*	**3.584**	**1.629**	**54.5%**
Limitation			64%

$$\text{Destruction Efficiency} = \frac{\text{Inlet Rate - Outlet Rate}}{\text{Inlet Rate}} * 100$$

* Run number one not used. See Comments below.

II. Comments

The testing on May 4, 2006 was performed without any sampling problems that we were aware of except as noted below. We believe the test results presented accurately indicate the emission rate of the source during each test period. All leak checks and calibrations were within method tolerances.

Near the end of run number one power was lost due to a breaker blowing. The Particulate sampling train and a heated line for the VOC train was on this line. Plant personnel found an additional outlet on a separate circuit that could be used. No additional problems occurred.

No problems were suspected with the Phenol testing until we received the Lab results. We were not

overly concerned about the non-detects from the small inlet duct based on prior conversations with Mr Robbie Sage of Atlas Resins. Mr. Sage indicated that there shouldn't be much if any Phenol in this duct.

The non detect on run number one from the large inlet duct is of concern and we do not have an explanation for this. We verified results from the lab. The post sample flow rate checked was also OK. Based on the results from runs two and three we do not believe the non-detect from run number to be accurate. We have, therefore, not included the results from run number one in the average.

III. Process Description

The testing was performed on a sand resin coating process (P51). Heated sand and flake resins, with a small amount of additives are mixed in the Batch Mixer. An aqueous hexamethylenetetramine solution is added to the Batch Mixer to cross-link the melted flake resin and begins cooling the coated sand. Each Batch Mix is 2,500 pounds. During the test period there was an average of 11.6 batches or 29,731 lbs/hr throughput. Each batch is discharge into a Continuous Mixer (P52) which is designed to keep the process flowing as discrete particles until the product has cooled. The Continuous Mixer converts the batch process into a continuous process.

There is a wet scrubber (C50) that is used to control emission from this source. The wet scrubber also controls emissions from (P53, P54, T31, T32).

Process data during the testing was collected by Atlas Resin Proppants personnel and is contained in the Appendix. The process data included the pressure drop across the wet scrubber, liquor flow rate to scrubber, pH of wet scrubber absorbing fluid and solids of the scrubber fluid.

IV. Stack Testing and Analytical Procedures

The procedures for sampling, testing, instrumentation and analysis as described by the U.S. EPA were followed. The EPA reference methods used in the testing program are summarized below.

Method 1: Sample and Velocity Traverse Locations

The outlet sampling site lies in a straight section of 19.25" inside diameter stacks. The sampling ports are more than 8 diameters downstream and more than 2.0 diameters upstream from any flow disturbances. Twelve points were sampled, six on each traverse. Each point was sampled for 5.0 minutes for a total test run time of 60 minutes. The location of the traverse points is shown below:

Location of Traverse Points From Stack Wall

Inside Stack Diameter = 19.25"

Traverse Point No.	Percent from Wall	Inches from Wall
1	4.4	0.8
2	14.6	2.8
3	29.6	5.7
4	70.4	13.6
5	85.4	16.4
6	95.6	18.4

The sampling site for the two inlet locations lies in a 16 and 8 inch diameter ducts. The sampling ports for both ducts are more than 6 diameters downstream and more than 2.0 diameters upstream from any flow disturbances. The velocity traverse was performed at sixteen points, eight on each traverse, on the large inlet duct.

Method 2: Stack gas velocity and Volumetric Flow Rate

For each tests run on the outlet a velocity traverse was made with a calibrated "S" Pitot tube having a co-efficient of 0.840. The velocity head was read on an inclined manometer to the nearest 0.01 inches of water. Temperature was measured with a chromel-alumel thermocouple. Sampling site barometric pressure was verified from National Weather Service data.

For each tests run on the large inlet duct a velocity traverse was made with a standard Pitot tube having a co-efficient of 0.99. The flow rate of the small inlet duct was calculated based on the difference of the outlet and large inlet duct.

Method 3: Component Gas Analysis

During the course of each emission test a Tedlar bag was filled with stack gases. Analysis for Carbon Dioxide (CO_2), Oxygen (O_2), and Nitrogen (N_2) was performed using an Orsat type analyzer.

Method 4: Moisture Content

The moisture content of the outlet stack gas was determined by condensing in three impingers in an ice bath and absorbing any remaining moisture in a fourth impinger containing silica gel. The moisture content of the large inlet duct was determined using the wet bulb/dry bulb technique.

Method 5 & 202: Particulate Emission

Particulate material is withdrawn isokinetically from the stack and collected on a glass fiber filter maintained in the temperature range of 223° F. - 273° F. The sample gas stream is dried as in Method 4 above. The sample gas is then passed through a metering system which measures both the cumulative volume of gas sampled and the instantaneous sampling rate. Method 202 Methylene Chloride extraction is performed on the impinger contents to determine condensible Particulate.

Sampling Train

A schematic of the sampling train used in this method is shown in Figure 5-1 (See Page #9). The sampling train consists of the following components:

Stainless steel, buttonhook-type nozzle.
Teflon gasket.
Titanium probe Liner.
Glass filter holder.
Electrically heated enclosed sample box.
Ice-water bath.
Greenburg-Smith impinger.
Greenburg-Smith impinger.
Modified Greenburg-Smith impinger.
Modified Greenburg-Smith impinger.
Check valve.
Vacuum gauge.
Main valve.
Leak-free vacuum pump.
Bypass valve.
Dry gas meter.
Calibrated orifice.
Dual manometer.
Type "S" Pitot tube.

A more detailed description of the sampling train components follows:

1. Probe Nozzle: Stainless steel with sharp, tapered leading edge. A 0.244 inch diameter (as measured on site with a caliper) nozzle was used in all the tests.

2. Probe Liner: Titanium with a heating system to maintain a gas temperature at the exit during sampling of 223° F. to 273° F.

3. Pitot Tube: A Type "S" Pitot tube attached to the probe allowed constant monitoring of the stack gas velocity. The Pitot tube has a co-efficient of 0.840. ΔP was read from an inclined manometer.

4. Differential Pressure Gauge: An inclined manometer with a range of 0 - 8 inches water was used to obtain ▲H.

5. Filter Holder: Borosilicate glass, with a Teflon filter support and gasket.

6. Filter Heating System: Thermostat controlled electrical resistance type heater capable of maintaining a temperature of 223°F. - 273°F. around the filter holder.

7. Impingers: Four Pyrex glass impingers connected in series with a leak-free ground glass fitting. The first and second impinger were a Greenburg-Smith design with a standard tip. The third and fourth impingers were Greenburg-Smith design with a modified (straight) tip. The. A thermometer was in place to measure the temperature at the outlet of the fourth impinger.

8. Metering System: The vacuum gauge, leak-free pump, thermometer, temperature compensated dry gas meter, and related equipment are shown in Figure 5-1. The sampler is a Millennium Instruments- Mill 5 Stack sampler.

Sampling Procedures

Prior to testing, the sampling train is cleaned and set up as follows:

A three-inch diameter glass fiber filter was dried in a desiccator for more than twenty-four hours and weighed on an analytical balance to the nearest 0.1 milligram (mg.). One hundred milliliters (ml.) of distilled water was placed in each of the first two impingers. Two hundred grams dry silica gel (indicating) was placed in the fourth impinger. The third impinger was left dry and empty. The sampling train was assembled as shown in Figure 5-1 (Page #9). Based on the preliminary velocity and temperature traverse, an appropriate nozzle size was selected to provide an adequate sampling rate.

After assembly, the sampling train was leak-checked at the inlet to the nozzle at 15 inches mercury vacuum. If a leak rate of greater than 0.02 $ft.^3$/min. was observed, the system was checked and leaks corrected. The leak-check procedure was repeated until the leakage rate was less than 0.02 $ft.^3$/min.

Approximately fifteen minutes before the start of the test, the probe and filter box heaters were turned on and allowed to warm up to sampling temperatures. Ice was placed around the impingers. At the start of a test run, the dry gas meter reading was recorded on the data sheet, the probe was placed in the stack at the first sampling point, and the velocity pressure was read. Using an Isokinetic flow rate calculator, the desired orifice meter pressure was determined. The sample pump was then turned on and the time was recorded. The main and Bypass valves were immediately adjusted to give the desired sampling rate. For each point, the following data was recorded: Traverse Point Number, Sampling Time, Stack Temperature, Velocity Head, Orifice Meter Reading, Dry Gas Meter Volume, Meter Temperature, Box Temperature, and Pump Vacuum. Near the end of the sampling time (approximately 10 seconds remaining), the nozzle was moved to the next point and exactly at the start

of the next sampling period, the dry gas meter volume was recorded. The point by point sampling procedures were then repeated until the test run was completed. While moving between ports, the pump was turned off. At the completion of the test run, the pump was turned off, the dry gas meter volume recorded, and the probe was removed from the stack. The sampling train was leak-checked from the sample nozzle at the highest vacuum pulled during the test to verify the leak-free integrity of the system.

Sample Recovery

Sample recovery of the probe and probe nozzle was accomplished near the sampling site. The inner surface of each was rinsed with acetone along with cleaning by a brush until no visible particulate was present in the rinse. The impingers and filter holder contents were recovered back at the lab. The contents of the first three impingers were measured volumetrically and placed in a clean container. The silica gel in the fourth impinger was transferred to a clean, dry container and weighed. The filter was carefully transferred to a petri dish. Any filter material which stuck to the gasket was scraped loose and transferred to the petri dish. The upstream portion of the filter holder was washed with acetone. The wash from the filter holder was combined with the washes from the probe and probe nozzle. The container was labeled to identify the test run.

Sample Analysis

In the laboratory, the filter and any loose particulate were placed in a desiccator for more than twenty-four hours. The material was then weighed on an analytical balance to the nearest 0.1 mg.

The volume of the upstream acetone wash was measured and transferred to a tared beaker. The acetone was evaporated at room temperature. After desiccation, the beaker was reweighed. Simultaneously, a 100 ml. acetone blank was evaporated and the residue weight was determined. The net residue weight of the sample washes has been adjusted for the acetone blank.

The water collected from the first three impingers was measured to the nearest ml. All the sample exposed glassware was rinsed with methylene chloride and placed in a separate clean, dry container. The water collected was extracted with the methylene chloride rinse and two additional portions of methylene chloride. The extracts were evaporated in a tarred beaker at 20°C. A 100 ml. portion of the remaining water was evaporated in a tarred beaker at 103°C. The two weight gains were included in the total particulate. The total particulate collected is then the summation of the acetone probe wash weight gain plus the filter weight gain, plus the water extract weight gain plus the water residue weight gain.

The silica gel from each run was weighed to the nearest 0.1 gr. The weight gain of the silica gel was added to the volume of the liquid water collected in the first three impingers to obtain the total amount of water collected.

EPA Method 25A: VOC

This method applies to the measurement of total gaseous organic concentration of vapors. A gas sample was extracted via a heated Teflon sample line to the flame ionization analyzer.

The flame ionization analyzer used during the tests was a J.U.M. Model 3-100 total hydrocarbon analyzer with a heated detector. The Model 3-100 is a highly sensitive FID that provides a direct reading of total organic vapor concentrations with linear ranges of 0-10, 100 1000 10,000 & 100,000 ppm by volume. The instrument was calibrated using zero air and EPA protocol propane standards of 85.2 ppm. The calibrations were performed before and after each test run. The mid and low level gases were introduced to the analyzers using a Millennium Instruments, Inc Model 2002 Cal Gas Diluter that meets the requirements of EPA Method 205. The span and zero air calibration gases are mixed in the Cal Gas Diluter to pre set dilutions using calibrated orifices. Analyzer readings were logged on a strip chart recorder. Instantaneous readings were also recorded every minute on a laptop computer. The concentration of Methane/ethane was subtracted from the total VOC concentration by analyzing the contents of a Tedlar bag filled during each test. This was accomplished by placing a charcoal tube between the Tedlar bag and the analyzer.

NIOSH Method 2546: Phenol Determination

The sampling was performed using XAD-7 tubes. The sampling on the outlet was performed at approximately 175 cc/minute. A dry gas meter was used to determine the total sample volume. The sampling on the two inlet ducts was performed at 50 cc/minutes. The sampling rate was checked before and after each test run with a calibrated rotameter. Upon completion of the testing the samples were shipped to the NATLSCO Risk & safety Industrial Hygiene Laboratory for analysis. The Laboratory Analysis Report is contained in the Appendix.

Data Handling and Calculations

All mathematical calculations were made according to accepted techniques using U.S. EPA equations. A laptop computer was used to store, calculate and generate the final emission results. Standard conditions of 29.92 inches mercury pressure and 68°F. temperature were used. Field calculations were rechecked, and the final results for each test run are presented in detail in the Appendix.

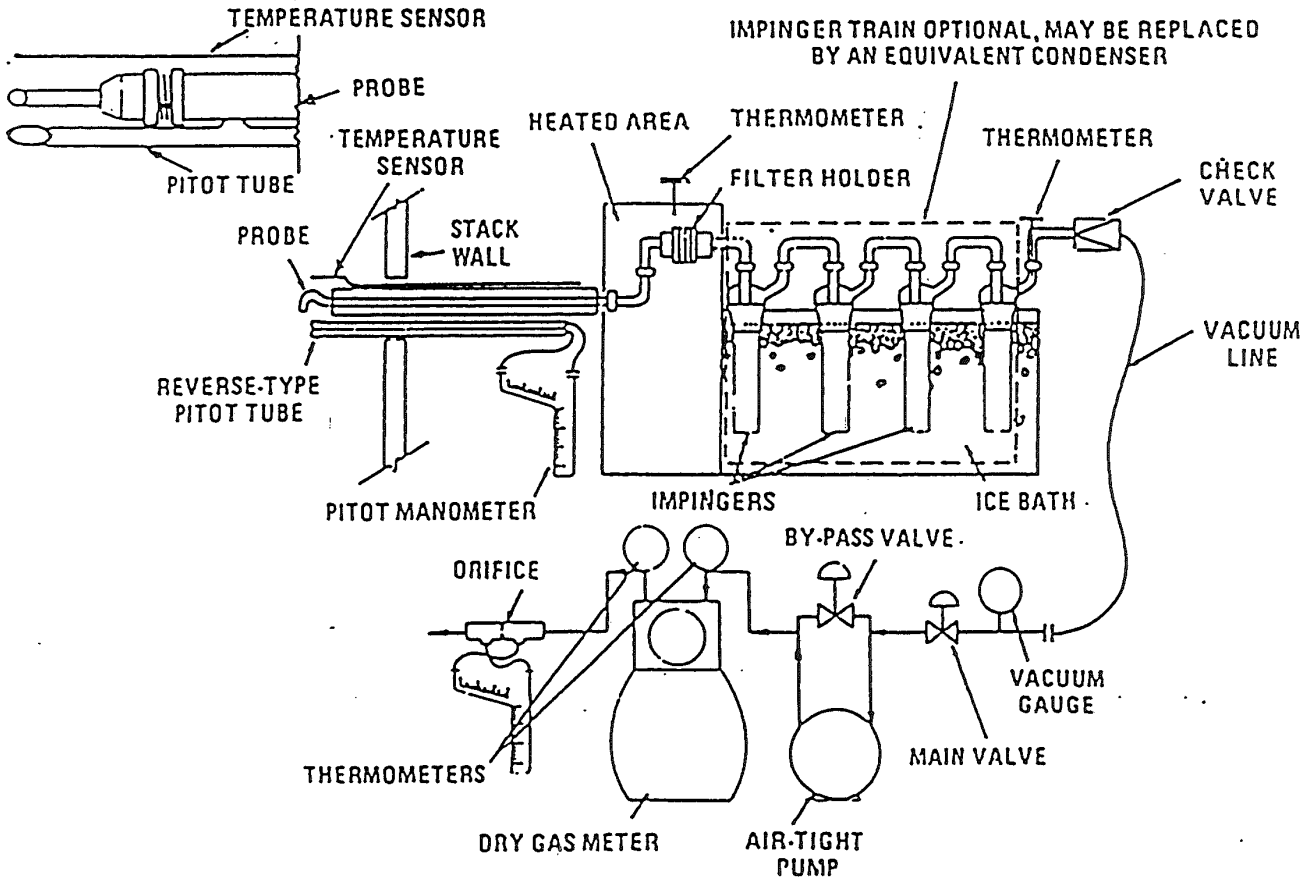


Figure 5-1 Particulate-sampling train.

Appendix

Particulate Laboratory Data

Source: Scrubber Stack
Analysis Date: 5/10-11/06
Test Run: 1-3

Run: No.	1	2	3	Blank
Filter: No.	1	2	3	4
Final Weight, mg.	390.0	406.4	348.2	369.9
Tare Weight, mg.	372.1	373.3	322.9	370.4
Weight Gain, mg.	**17.9**	**33.1**	**25.3**	-0.5
Acetone Probe Wash:				
Final Weight, mg.	49747.3	54217.8	52355.1	50741.2
Tare Weight, mg.	49743.6	54214.0	52351.7	50739.4
Blank Correction, mg.	-0.4	-0.4	-0.4	
Volume, ml.	20	20	22	100
Weight Gain, mg.	**3.3**	**3.4**	**3.0**	1.8
				0.018 mg/ml
Impinger Water Extracts: (CH2CL2)				
Final Weight, mg.	50766.2	51115.9	56157.7	51446.9
Tare Weight, mg.	50733.1	51080.7	56123.9	51445.6
Blank Correction, mg.	-1.3	-1.3	-1.3	
Weight Gain, mg.	**31.8**	**33.9**	**32.5**	1.3
Impinger Water Residue:	200 ml aliquot			
Final Weight, mg.	115848.3	115953.1	116987.2	98450.5
Tare Weight, mg.	115833.8	115938.3	116972.8	98448.7
Blank Correction, mg.	-1.8	-1.8	-1.8	
Volume, ml.	345	360	370	340
Weight Gain, mg.	**21.9**	**23.4**	**23.3**	1.8
Total Particulate, mg.	***74.9***	***93.8***	***84.1***	

Company	Atlas Resin		Static Pressure	-0.1		Cp	0.84	
Location	Scrubber Outlet		Barometric Pressure	29.05		Meter H@	1.64	
Date	05/04/06		Assumed Moisture,%	4		Y Factor	0.9915	
Ambient Temp	75		Heating Box Temp	223-273		Nozzle Dia	0.244	0.00032
Test Run#	1		Probe Heater Temp	223-273		Kref=	43.87	
Stack Dia.& Area	19.25	2.02	Filter #	1		Kb =	0.00613	
Operator	bfl		Sample Box #	1		Point Time	5	

0:05:00

					Dry Gas Meter						
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
9:00	1	5	99	75	75	186.450	0.440	0.6633	1.38	223-273	4
9:05:00	2	5	99	75	75	89.97	0.490	0.7000	1.54	223-273	
9:10:00	3	5	98	77	76	93.61	0.530	0.7280	1.68	223-273	5
9:15:00	4	5	100	79	76	97.43	0.540	0.7348	1.71	223-273	
9:20:00	5	5	100	81	77	201.11	0.480	0.6928	1.53	223-273	
9:25:00	6	5	98	83	78	4.68	0.390	0.6245	1.25	223-273	
9:31:00	7	5	98	83	78	8.05	0.510	0.7141	1.64	223-273	5
9:36:00	8	5	98	87	80	11.81	0.560	0.7483	1.82	223-273	
9:41:00	9	5	98	88	81	15.71	0.540	0.7348	1.76	223-273	
9:46:00	10	5	99	90	82	19.66	0.520	0.7211	1.70	223-273	
9:57:00	11	5	98	88	83	23.30	0.500	0.7071	1.63	223-273	
10:02:00	12	5	98	91	84	27.02	0.380	0.6164	1.25	223-273	
10:07:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					230.455					
Total		60				44.005					
Average			98.6	83.1	78.8		0.4900	0.6988	1.57		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			272	211
Initial			250	200
Net H2O			22	11
Total H2O Collected, ml				33

Orsats			
Bag #	CO2	O2	N2
1	0.0	21.0	79.0
Average	0.0	21.0	79.0

Tm=	540.9	Ts=	558.6	Md=	28.84	Acfm=	5003
Pm=	29.17	Ps=	29.04	Ms=	28.45	dscfm=	4425
Vmstd=	41.515	Bwo=	0.036	Vs=	41.260	I=	97.3

Comments: Lost power at 9:50, restarted about 6 minutes later.

Company	Atlas Resin		Static Pressure	-0.1		Cp	0.84	
Location	Scrubber Outlet		Barometric Pressure	29.05		Meter H@	1.64	
Date	05/04/06		Assumed Moisture,%	4		Y Factor	0.9915	
Ambient Temp	75		Heating Box Temp	223-273		Nozzle Dia	0.244	0.00032
Test Run#	2		Probe Heater Temp	223-273		Kref=	45.350	
Stack Dia.& Area	19.25	2.02	Filter #	2		Kb =	0.0063375	
Operator	bfl		Sample Box #	2		Point Time	5	

0:05:00

					Dry Gas Meter						
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
10:26	1	5	99	86	86	230.850	0.430	0.6557	1.45	223-273	4
10:31:00	2	5	100	87	86	34.44	0.470	0.6856	1.59	223-273	
10:36:00	3	5	100	89	86	38.11	0.520	0.7211	1.76	223-273	5
10:41:00	4	5	101	91	86	41.97	0.520	0.7211	1.77	223-273	
10:46:00	5	5	101	93	87	45.84	0.490	0.7000	1.67	223-273	
10:51:00	6	5	101	94	88	49.66	0.440	0.6633	1.51	223-273	
10:57:00	7	5	101	94	88	53.23	0.500	0.7071	1.71	223-273	5
11:02:00	8	5	100	95	89	56.98	0.530	0.7280	1.83	223-273	
11:07:00	9	5	101	96	89	60.94	0.520	0.7211	1.79	223-273	
11:12:00	10	5	101	97	90	64.94	0.540	0.7348	1.87	223-273	5.5
11:17:00	11	5	101	97	91	68.96	0.510	0.7141	1.77	223-273	
11:22:00	12	5	101	98	91	72.94	0.430	0.6557	1.49	223-273	
11:27:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					276.460					
Total		60				45.61					
Average			100.6	93.1	88.1		0.4917	0.7007	1.69		

Leak Check Before <.005 cfm at 15"hg Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			276	211
Initial			250	200
Net H2O			26	11
Total H2O Collected, ml				37

Orsats			
Bag #	CO2	O2	N2
2	0.0	21.0	79.0
Average	0.0	21.0	79.0

Tm=	550.6	Ts=	560.6	Md=	28.84	Acfm=	5029
Pm=	29.17	Ps=	29.04	Ms=	28.41	dscfm=	4416
Vmstd=	42.286	Bwo=	0.040	Vs=	41.472	I=	99.3

Comments:

Company	Atlas Resin		Static Pressure	-0.1	Cp	0.84		
Location	Scrubber Outlet		Barometric Pressure	29.05	Meter H@	1.64		
Date	05/04/06		Assumed Moisture,%	4	Y Factor	0.9915		
Ambient Temp	75		Heating Box Temp	223-273	Nozzle Dia	0.244	0.00032	
Test Run#	3		Probe Heater Temp	223-273	Kref=	45.350		
Stack Dia.& Area	19.25	2.02	Filter #	3	Kb =	0.0063375		
Operator	bfl		Sample Box #	3	Point Time	5		

0:05:00

					Dry Gas Meter						
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
11:50	1	5	101	91	91	276.805	0.400	0.6325	1.37	223-273	4
11:55:00	2	5	102	91	91	80.33	0.440	0.6633	1.51	223-273	
12:00:00	3	5	101	93	91	83.93	0.520	0.7211	1.79	223-273	
12:05:00	4	5	101	94	91	87.87	0.500	0.7071	1.72	223-273	
12:10:00	5	5	101	96	91	91.71	0.490	0.7000	1.70	223-273	
12:15:00	6	5	101	96	91	95.46	0.410	0.6403	1.42	223-273	
12:21:00	7	5	101	96	91	98.90	0.480	0.6928	1.66	223-273	
12:26:00	8	5	101	97	92	302.72	0.520	0.7211	1.81	223-273	
12:31:00	9	5	101	98	92	6.64	0.520	0.7211	1.81	223-273	
12:36:00	10	5	101	98	93	10.57	0.540	0.7348	1.88	223-273	
12:41:00	11	5	102	99	93	14.50	0.500	0.7071	1.74	223-273	
12:46:00	12	5	101	99	93	18.44	0.410	0.6403	1.43	223-273	
12:51:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					321.944					
Total		60				45.139					
Average			101.2	95.7	91.7		0.4775	0.6901	1.65		

Leak Check Before <.005 cfm at 15"hg Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			278	211
Initial			250	200
Net H2O			28	11
Total H2O Collected, ml				39

Orsats			
Bag #	CO2	O2	N2
3	0.0	21.0	79.0
Average	0.0	21.0	79.0

Tm=	553.7	Ts=	561.2	Md=	28.84	Acfm=	4959
Pm=	29.17	Ps=	29.04	Ms=	28.38	dscfm=	4337
Vmstd=	41.613	Bwo=	0.042	Vs=	40.892	I=	99.5

Comments:

Location:	Scrubber Outlet			
Date:	05/04/06			
Time:	9:00 10:07	10:26 11:27	11:50 12:51	
Test Run	1	2	3	Average
STACK GAS DATA:				
Temperature:	98.6	100.6	101.2	100.1
Velocity, ft/sec.	41.260	41.472	40.892	41.208
Gas Volume, acfm	5,003	5,029	4,959	4,997
Gas Volume, scfm (wet)	4,591	4,598	4,529	4,572
Gas Volume, scfm (dry)	4,425	4,416	4,337	4,393
Moisture, %	3.6	4.0	4.2	3.9
Carbon Dioxide, % (dry)	0.0	0.0	0.0	0.0
Oxygen, % (dry)	21.0	21.0	21.0	21.0
Nitrogen, % (dry)	79.0	79.0	79.0	79.0
Molecular Weight, (dry)	28.84	28.84	28.84	28.84
Molecular Weight, (wet)	28.45	28.41	28.38	28.41
SAMPLING DATA:				
Total Time, min.	60	60	60	
Volume, dscf	41.515	42.286	41.613	
Isokinetic Ratio, %	97.3	99.3	99.5	
PARTICULATE EMISSION RATES:				
Fronthalf Particulate, mg	21.2	36.5	28.3	28.7
Emission Rate, Fronthalf lbs/hr.	0.2990	0.5043	0.3903	0.3978
Total Particulate Collected, mg	74.9	93.8	84.1	84.3
Concentration, grains/dscf	0.02778	0.03416	0.03112	0.03102
Concentration, lbs/dscf	3.9782E-06	4.8912E-06	4.4563E-06	4.442E-06
Emission Rate, Total lbs/hr.	1.0562	1.2960	1.1597	1.1707
Emission Rate, lb/1000 lb Stack Gas	0.0519	0.0637	0.0579	0.0579
PHENOL EMISSION RATE:				
Total Phenol Collected, mg	0.940	1.000	1.100	1.013
Sample Volume, liters	11.83	10.57	10.56	10.99
Phenol Concentration, mg/m3	79.46	94.61	104.17	92.74
Phenol Emission Rate, lb/hr	**1.3172**	**1.5651**	**1.6926**	1.5249

Sample Calculations, Run #1

Static Pressure, "H20=	-0.1	Nozzle Diameter=	0.244
Barometric Pressure, "hg=	29.05	Nozzle Area, sq. ft.=	0.00032
Meter h Coeff=	1.64	Absolute Stack Temp, R=	558.6
Y Factor=	0.9915	Absolute Meter Temp, R=	540.9
Dry Gas Meter Volume, Cu. Ft.=	44.005	Ave sqrt delta p=	0.6988
Water Collected, (Vlc), mls=	33	Stack Area, sq, ft.=	2.02
Absolute Stack Pressure, "Hg=	29.04	Pitot Tube Coeff., Cp=	0.84
Absolute Meter Pressure, " Hg=	29.17	Sampling Time, Min.=	60
Percent Oxygen=	21.0	Particulate, (Mn),mg=	74.9
Percent Carbon Dioxide=	0.0		
Percent Nitrogen=	79.0		

Volume of Sample at Standard Conditions, Dry Basis

17.647 *	Y *	Vm *	Pm /	Tm =	Vmstd		
17.647	0.9915	44.005	29.17	540.9		Vmstd =	41.515

Volume of Water Vapor in Sample at Standard Conditions

.04707 *	Vlc =	Vwstd		
0.04707	33		Vwstd =	1.553

Proportion of Water Vapor in Gas Stream

Vwstd /	(Vmstd +	Vwstd) =	Bwo	
1.553	41.515	1.553	Bwo =	0.036

Concentration of Particulate Matter, Dry Basis

Mn *	.0154 /	Vmstd =	C's	
74.9	0.0154	41.515	C's =	0.027784

Mn *	2.205E-06	/ Vmstd =	Cs	
74.9	2.205E-06	41.515245	Cs =	3.978E-06

Dry Molecular Weight of Stack Gas

.44 *	%CO2 +	.32 *	%O2 +	.28 *	%N2 =	Md	
0.44	0.0	0.32	21.0	0.28	79.0	Md =	28.840

Molecular Weight of Stack Gas, Wet Basis

Md *	(1-Bwo) +	18 *	Bwo =	Ms		
28.840	0.964	18	0.036		Ms =	28.449

Stack Gas Velocity, fps

85.49 *	Ave sqrt p *	Cp *	SQRT(Ts	/ Ps	/ Ms) =	Vs	
85.49	0.699	0.84	558.6	29.04	28.449	Vs =	41.260

Volumeteric Flow Rate, dscfm

63529 *	(1-Bwo) *	Vs *	Stk Area *	Ps /	Ts =	Qs	
63529	0.964	41.260	2.02	29.04	558.6	Qs =	265,515

Emission Rate, lbs/hr

Qs *	Cs =	E.R.		
265,515	3.978E-06		E.R. =	1.056264

Percent of Isokinetic Sampling

1.6667 *	(.00267 *	Vlc +	Y *	Vm /	Tm *	Pm) *	Ts /	Time /	Vs /	Ps /	An = I
1.6667	0.00267	33	0.9915	44.005	540.9	29.17	558.6	60	41.260	29.04	0.000325
										I =	97.3

Company	Atlas Resin		Static Pressure	0		Cp	0.84	
Location	Scrubber Outlet		Barometric Pressure	29.05		Meter H@	0	
Date	05/04/06		Assumed Moisture,%	4		Y Factor	1.013	
Ambient Temp	75		Heating Box Temp			Nozzle Dia		0.00000
Test Run#	henol - Out1		Probe Heater Temp			Kref=	0	
Stack Dia.& Area	19.25	2.02	Filter #			Kb =	0.00000	
Operator	bfl		Sample Box #	1		Point Time	5	

0:05:00

				Dry Gas Meter							
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Velocity Head Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
9:01	1	5		74	74	451.870			0.00		
9:06:00	2	5		74	74				0.00		
9:11:00	3	5		74	74	71.94			0.00		
9:16:00	4	5		74	74				0.00		
9:21:00	5	5		75	75	52.01			0.00		
9:26:00	6	5		75	75				0.00		
9:31:00	7	5		75	75	52.08			0.00		
9:36:00	8	5		75	75				0.00		
9:41:00	9	5		75	75	52.15			0.00		
9:46:00	10	5		75	75				0.00		
9:51:00	11	5		75	75	52.22			0.00		
9:56:00	12	5		75	75				0.00		
10:01:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					452.300					
Total		60				0.43					
Average			#DIV/0!	74.7	74.7		#DIV/0!	#DIV/0!	0.00		

Leak Check Before <.005 cfm at 15"hg Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			250	200
Initial			250	200
Net H2O			0	0
Total H2O Collected, ml				0

Orsats			
Bag #	CO2	O2	N2
1	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	534.7	Ts=	#DIV/0!	Md=	28.84	Acfm=	#DIV/0!
Pm=	29.05	Ps=	29.05	Ms=	28.84	dscfm=	#DIV/0!
Vmstd=	0.418	Bwo=	0.000	Vs=	#DIV/0!	I=	#DIV/0!

Comments: liters= 11.83

Company	Atlas Resin		Static Pressure	0		Cp	0.84	
Location	Scrubber Outlet		Barometric Pressure	29.05		Meter H@	0	
Date	05/04/06		Assumed Moisture,%	4		Y Factor	1.013	
Ambient Temp	75		Heating Box Temp			Nozzle Dia	0.000	0.00000
Test Run#	henol - Out2		Probe Heater Temp			Kref=	0.000	
Stack Dia.& Area	19.25	2.02	Filter #			Kb =	0	
Operator	bfl		Sample Box #	2		Point Time	5	

0:05:00

				Dry Gas Meter							
Clock Time	Traverse Point No	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
10:27	1	5		77	77	452.300			0.00		
10:32:00	2	5		77	77				0.00		
10:37:00	3	5		77	77	52.36			0.00		
10:42:00	4	5		78	78				0.00		
10:47:00	5	5		78	78	52.42			0.00		
10:52:00	6	5		78	78				0.00		
10:57:00	7	5		79	79	52.49			0.00		
11:02:00	8	5		79	79				0.00		
11:07:00	9	5		79	79	52.56			0.00		
11:12:00	10	5		80	80				0.00		
11:17:00	11	5		80	80	52.62			0.00		
11:22:00	12	5		80	80				0.00		
11:27:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					452.687					
Total		60				0.387					
Average			#DIV/0!	78.5	78.5		#DIV/0!	#DIV/0!	0.00		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			250	200
Initial			250	200
Net H2O			0	0
Total H2O Collected, ml				0

Orsats			
Bag #	CO2	O2	N2
2	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	538.5	Ts=	#DIV/0!	Md=	28.84	Acfm=	#DIV/0!
Pm=	29.05	Ps=	29.05	Ms=	28.84	dscfm=	#DIV/0!
Vmstd=	0.373	Bwo=	0.000	Vs=	#DIV/0!	I=	#DIV/0!

Comments: liters= 10.57

Company	Atlas Resin		Static Pressure	0		Cp	0.84	
Location	Scrubber Outlet		Barometric Pressure	29.05		Meter H@	0	
Date	05/04/06		Assumed Moisture,%	4		Y Factor	1.013	
Ambient Temp	75		Heating Box Temp			Nozzle Dia	0.000	0.00000
Test Run#	henol -Out3		Probe Heater Temp			Kref=	0.000	
Stack Dia.& Area	19.25	2.02	Filter #			Kb =	0	
Operator	bfl		Sample Box #	3		Point Time	5	

0:05:00

						Dry Gas Meter					
Clock Time	Traverse Point No.	Sampling Time, Min.	Stack Temp, Ts	Inlet Temp, Tmi	Outlet Temp, Tmo	Volume Vm, ft3	Velocity Head Delta P	Sqrt Delta P	Orifice Delta H	Box Temp	Pump Vacuum
11:51	1	5		80	80	452.687			0.00		
11:56:00	2	5		80	80				0.00		
12:01:00	3	5		80	80	52.75			0.00		
12:06:00	4	5		80	80				0.00		
12:11:00	5	5		80	80	52.81			0.00		
12:16:00	6	5		80	80				0.00		
12:21:00	7	5		80	80	52.88			0.00		
12:26:00	8	5		80	80				0.00		
12:31:00	9	5		80	80	52.95			0.00		
12:36:00	10	5		81	81				0.00		
12:41:00	11	5		81	81	53.01			0.00		
12:46:00	12	5		81	81				0.00		
12:51:00	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
	21										
	22										
	23										
	24										
	25					453.075					
Total		60				0.388					
Average			#DIV/0!	80.3	80.3		#DIV/0!	#DIV/0!	0.00		

Leak Check Before <.005 cfm at 15"hg

Leak Check After <.005 cfm at 10"hg

Water	Impingers			
Collected	1	2	3	4
Final			250	200
Initial			250	200
Net H2O			0	0
Total H2O Collected, ml				0

Orsats			
Bag #	CO2	O2	N2
3	0.0	20.9	79.1
Average	0.0	20.9	79.1

Tm=	540.3	Ts=	#DIV/0!	Md=	28.84	Acfm=	#DIV/0!
Pm=	29.05	Ps=	29.05	Ms=	28.84	dscfm=	#DIV/0!
Vmstd=	0.373	Bwo=	0.000	Vs=	#DIV/0!	I=	#DIV/0!

Comments: liters= 10.56

VOC Readings

0:01:00	Run #1 9:00-10:00		Run #2 10:27-11:27		Run #3 11:50-12:50	
		Outlet		Outlet		Outlet
1	9:00	77.6	10:27	69.1	11:50	68.7
2	9:01	68.0	10:28	82.5	11:51	69.1
3	9:02	59.8	10:29	92.8	11:52	72.6
4	9:03	56.9	10:30	82.3	11:53	93.1
5	9:04	65.1	10:31	70.3	11:54	82.1
6	9:05	81.8	10:32	68.4	11:55	72.4
7	9:06	70.5	10:33	74.0	11:56	68.5
8	9:07	62.6	10:34	94.5	11:57	74.3
9	9:08	60.8	10:35	85.5	11:58	94.3
10	9:09	64.8	10:36	73.8	11:59	87.2
11	9:10	86.7	10:37	71.3	12:00	76.6
12	9:11	75.4	10:38	75.5	12:01	69.6
13	9:12	66.4	10:39	93.4	12:02	76
14	9:13	61.0	10:40	91.1	12:03	89.8
15	9:14	66.1	10:41	77.1	12:04	88.4
16	9:15	82.6	10:42	71.6	12:05	81.5
17	9:16	76.2	10:43	75.6	12:06	74.6
18	9:17	69.2	10:44	85.7	12:07	75.3
19	9:18	63.4	10:45	91.9	12:08	85.6
20	9:19	65.1	10:46	80.6	12:09	91.3
21	9:20	76.3	10:47	72.5	12:10	83.6
22	9:21	81.4	10:48	74.1	12:11	72.8
23	9:22	73.8	10:49	75.7	12:12	73.9
24	9:23	64.7	10:50	92.3	12:13	76.5
25	9:24	64.9	10:51	79.4	12:14	94.1
26	9:25	78.1	10:52	73.3	12:15	86.3
27	9:26	84.6	10:53	70.0	12:16	74.8
28	9:27	73.1	10:54	74.3	12:17	71.9
29	9:28	66.4	10:55	93.3	12:18	76.4
30	9:29	64.3	10:56	85.7	12:19	95.7
31	9:30	66.7	10:57	76.0	12:20	90.6
32	9:31	86.6	10:58	70.6	12:21	77.7
33	9:32	77.8	10:59	74.5	12:22	72.4
34	9:33	67.7	11:00	88.9	12:23	76.7
35	9:34	62.8	11:01	87.3	12:24	89.9
36	9:35	66.2	11:02	78.4	12:25	90.0
37	9:36	83.1	11:03	70.8	12:26	78
38	9:37	80.3	11:04	74.8	12:27	72.8
39	9:38	69.5	11:05	83.4	12:28	74.8
40	9:39	63.5	11:06	90.5	12:29	84.5
41	9:40	67.2	11:07	80.6	12:30	94.3
42	9:41	77.6	11:08	70.7	12:31	84.1
43	9:42	82.2	11:09	73.4	12:32	75.7
44	9:43	70.3	11:10	85	12:33	74.4
45	9:44	64.7	11:11	92.2	12:34	76.9
46	9:45	66.5	11:12	82.3	12:35	96.4
47	9:46	81.4	11:13	72.2	12:36	85.5
48	9:47	81	11:14	69.7	12:37	76.2
49	9:48	72.7	11:15	74.1	12:38	73.4

50	9:49	62.6	11:16	93.6	12:39	77.7
51	9:50	59.9	11:17	86.2	12:40	94.4
52	9:51	63.3	11:18	74.4	12:41	90.6
53	9:52	82.8	11:19	70.8	12:42	80.8
54	9:53	73.4	11:20	74.1	12:43	74.7
55	9:54	61.4	11:21	86.2	12:44	79.5
56	9:55	59.2	11:22	85	12:45	92.2
57	9:56	62.2	11:23	76.2	12:46	89.6
58	9:57	83.3	11:24	69.7	12:47	79.5
59	9:58	75.4	11:25	72.3	12:48	75.4
60	9:59	65.3	11:26	83.9	12:49	77.7
61	10:00	61.5	11:27	89.9	12:50	79.8
Average ppm as propane		70.6		79.6		80.9
Methane, ppm		1.0		1.0		1.0
Moisture		3.6		4.0		4.2
ppm as Propane, dry		72.19		81.83		83.40
dscfm		4,425		4,416		4,337
Pounds per hour		**2.19**		**2.48**		**2.48**
Average Pounds per hour		***2.38***				

Inlet - Large Duct
5/4/06

Velocity Traverse data

Run #1				Run #2				Run #3			
Delta P	sqrtdelta P	Delta P	sqrtdelta P	Delta P	sqrtdelta P	Delta P	sqrtdelta P	Delta P	sqrtdelta P	Delta P	sqrtdelta P
0.44	0.6633	0.52	0.7211	0.42	0.6481	0.42	0.6481	0.38	0.6164	0.46	0.6782
0.56	0.7483	0.57	0.7550	0.52	0.7211	0.52	0.7211	0.55	0.7416	0.52	0.7211
0.64	0.8000	0.60	0.7746	0.62	0.7874	0.58	0.7616	0.62	0.7874	0.60	0.7746
0.66	0.8124	0.60	0.7746	0.66	0.8124	0.58	0.7616	0.62	0.7874	0.60	0.7746
0.52	0.7211	0.58	0.7616	0.54	0.7348	0.58	0.7616	0.50	0.7071	0.56	0.7483
0.49	0.7000	0.59	0.7681	0.48	0.6928	0.55	0.7416	0.46	0.6782	0.54	0.7348
0.40	0.6325	0.48	0.6928	0.42	0.6481	0.46	0.6782	0.42	0.6481	0.48	0.6928
0.38	0.6164	0.46	0.6782	0.38	0.6164	0.40	0.6325	0.38	0.6164	0.38	0.6164
Pitot Coff			0.99								
sqrtdelta P			0.7263				0.7105				0.7077
Static Pres.			-1.80				-1.80				-1.80
Temp. F (db)			149				135				140
Temp. F (wb)			87				78				84
Vapor Pres.			1.2930				0.9666				1.1750
Baro. Pres			29.05				29.05				29.05
Stack Pres, Ps			28.92				28.92				28.92
%CO2			0.0				0.0				0.0
%O2			20.8				20.8				20.8
%N2			79.2				79.2				79.2
%H2O			2.27%				1.30%				2.07%
MW (d)			28.83				28.83				28.83
MW (w)			28.59				28.69				28.61
Stack Dia.			16				16				16
Stack Area			1.396				1.396				1.396
Velocity, ft/sec.			52.758				50.921				51.011
ACFM			4,420				4,266				4,274
SCFM (w)			3,704				3,659				3,635
SCFM (d)			3,620				3,611				3,560
Sample Vol, Liters			3.18				2.97				2.66
Phenol, mg			0.005				0.680				0.810
Phenol, mg/Cu. M			1.6				229.0				304.5
Inlet Large Duct - Phenol, #/hr			**0.021**				**3.097**				**4.060**
Air flow Volume, small duct			806				805				778
Sample Vol, Liters			3.03				2.97				2.66
Phenol, mg			0.005				0.005				0.005
Phenol, mg/Cu. M			1.65				1.68				1.88
Inlet Small Duct - Phenol, #/hr			**0.005**				**0.005**				**0.005**
Phenol,. Total inlet			0.026				3.102				4.066
Phenol, Outlet			1.317				1.565				1.693
Phenol, DE			-4908.5%				49.6%				58.4%

Plant	Hilton Resin		
Source id.	Dryer inlet duct		
Date	5/4/06		
Stack Diameter	16"		
Baro Pres	30.05 - 1.0		
Pitot tube Coff	.99		
Operators	BTO		
Run #	1		
Traverse Pt. No.	Vel Hd Delta p	Temp	
1	.44	149	
2	.56		
3	.64		
4	.66		
5	.52		
6	.49		
7	.40		
8	.38		
9	.52		
10	.57		
11	.60		
12	.60		
13	.58		
14	.59		
15	.48		
16	.46		
Temp-DB	149		
Temp-WB	87	O_2 20.8	
Static	-1.8	CO_2 0	

57"
10'

Plant			
Source id.			
Date			
Stack Diameter			
Baro Pres			
Pitot tube Coff			
Operators			
Run #		2	
Traverse Pt. No.	Vel Hd Delta p	Temp	
1	.42	135	
2	.52		
3	.62		
4	.66		
5	.54		
6	.48		
7	.42		
8	.38		
9	.42		
10	.52		
11	.58		
12	.58		
13	.58		
14	.55		
15	.46		
16	.40		
Temp-DB	135		
Temp-WB	78	O_2 20.8	
Static	-1.8	CO_2 0	

Plant			
Source id.			
Date			
Stack Diameter			
Baro Pres			
Pitot tube Coff			
Operators			
Run #		3	
Traverse Pt. No.	Vel Hd Delta p	Temp	
1	.38	140	
2	.55		
3	.62		
4	.62		
5	.50		
6	.46		
7	.42		
8	.38		
9	.46		
10	.52		
11	.60		
12	.60		
13	.56		
14	.54		
15	.48		
16	.36		
Temp-DB	140		
Temp-WB	84	O_2 20.8	
Static	-1.8	CO_2 0	

Plant			
Source id.	small inlet duct		
Date			
Stack Diameter	8"		
Baro Pres			
Pitot tube Coff			
Operators			
Run #			
Traverse Pt. No.	Vel Hd Delta p	Temp	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
Temp-DB			
Temp-WB			
Static			

65"
19'

Plant			
Source id.			
Date			
Stack Diameter			
Baro Pres			
Pitot tube Coff			
Operators			
Run #			
Traverse Pt. No.	Vel Hd Delta p	Temp	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
Temp-DB			
Temp-WB			
Static			

Plant			
Source id.			
Date			
Stack Diameter			
Baro Pres			
Pitot tube Coff			
Operators			
Run #			
Traverse Pt. No.	Vel Hd Delta p	Temp	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
Temp-DB			
Temp-WB			
Static			

Emission Testing Comment Sheet

	Site	Alton Grain		Date:	5/4/04	Cp=	84
	Source	outlet - Scrubber		Y=	1.0015	Nozzle=	247
	BP	30.05 - 1.0		Delta H=	1.164		

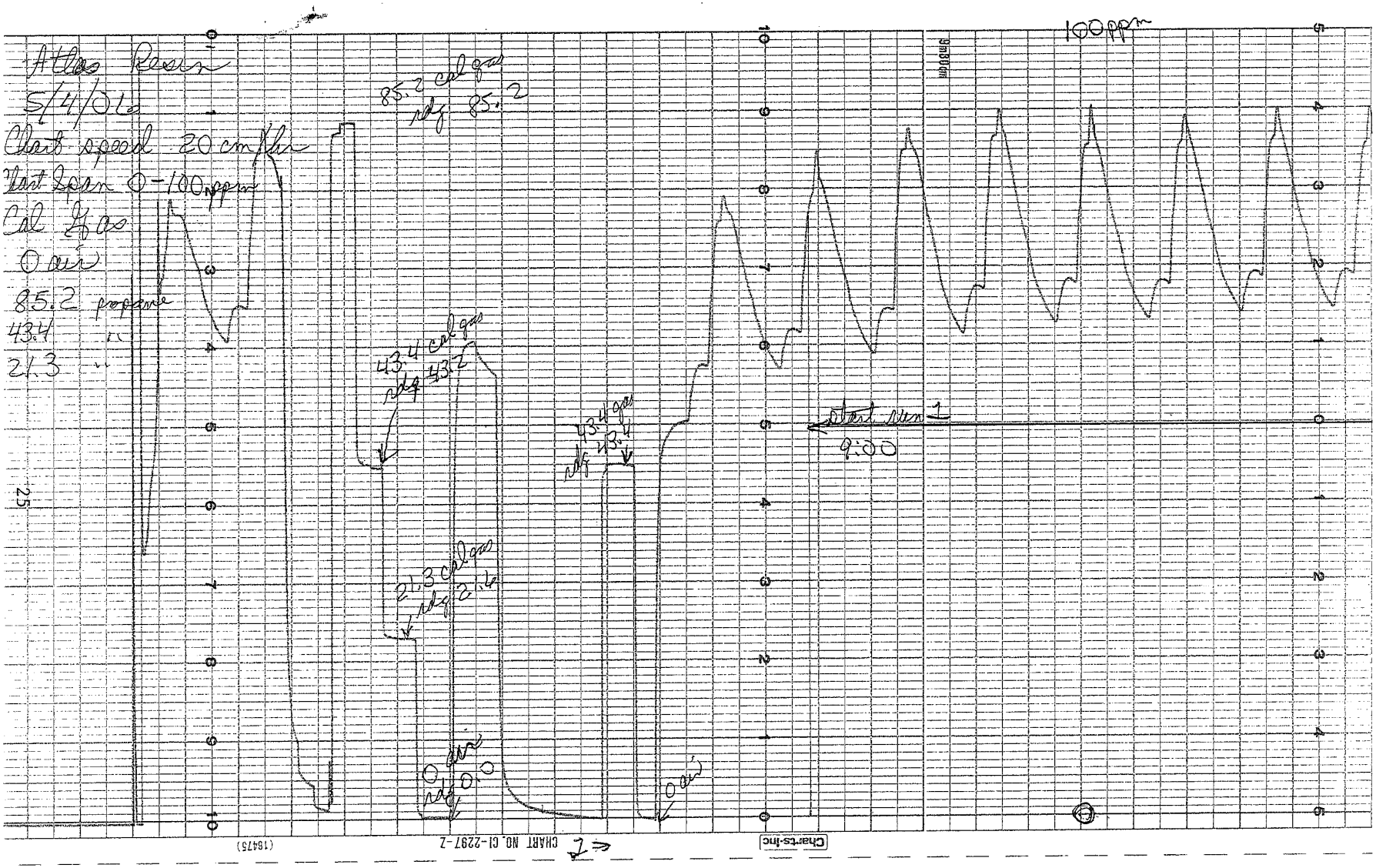
19.85	Leak Check Before	<.005 cfm@ 15 "hg	no leak 0 = 85.2	9:50
	Start DGM Vol	~~185.750~~ 186.450	451.870 0 = 0	25
.9	Start Time	9:00	9:01 85.2 = 85.2	
2.8	Stop Time	10:07	452.300 43.4 = 43.2	
5.7	Stop DGM Vol	230.455	21.3 = 21.6	
13.6	Leak Check After	<.005 cfm@ 10 "hg		
14.4			after 0 = 0.1	
18.4			43.4 = 43.2	
	CO2 %	0		DB 91
	O2 %	21.0		WB
			175cc	50cc / 50cc
	Impingers (1-3)	278 yellow tint	11.83 liters	55 3.18 liters / 50 3.03
	Dessicant	211	25096982	23005601 / 25096983
		clear throughout		from 108°

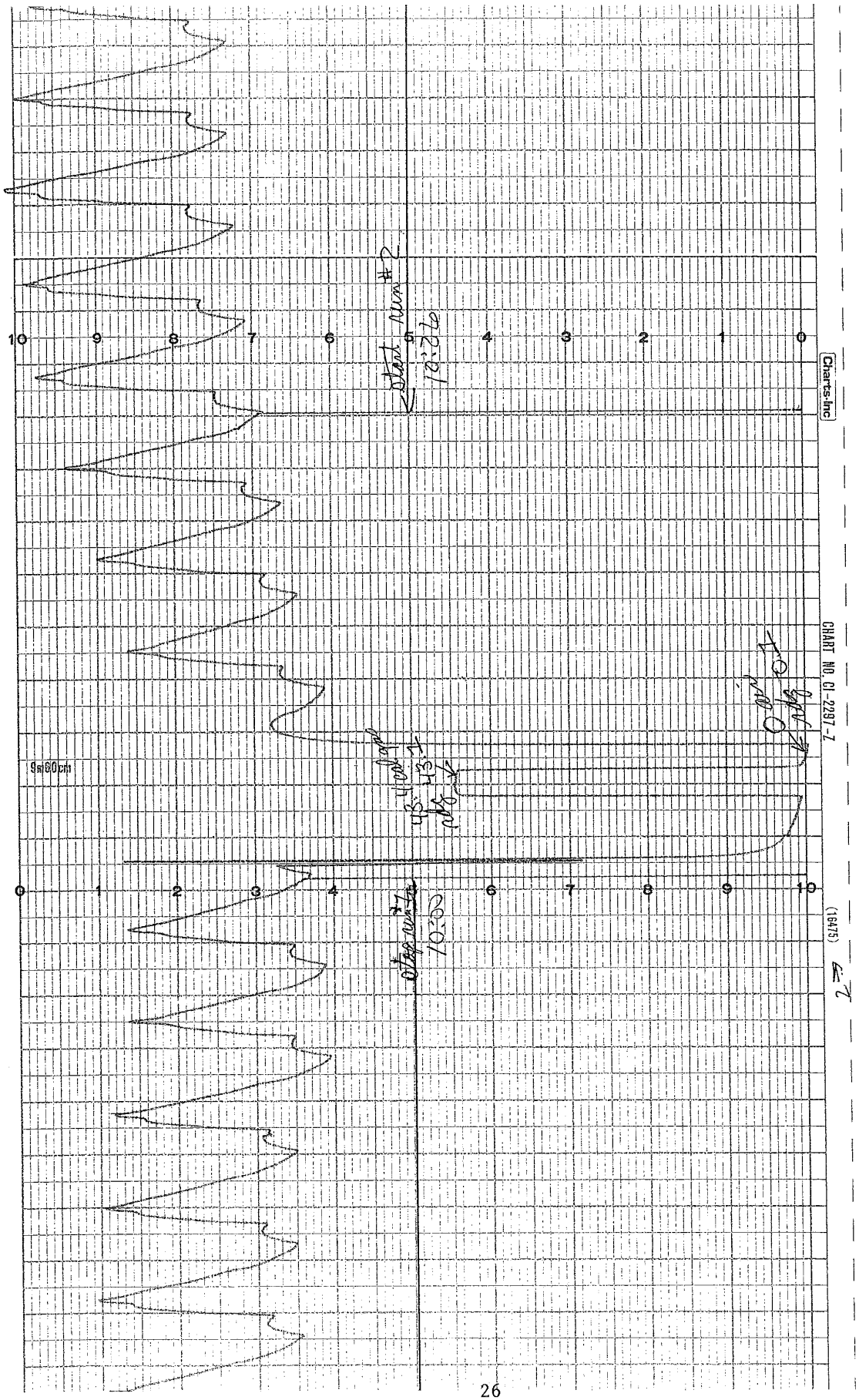
	Leak Check Before	<.005cfm@ 15 "hg		
	Start DGM Vol	230.850	452.300	
	Start Time	10:26	10:27	
	Stop Time	11:27	11:27	
	Stop DGM Vol	276.460	452.687	
	Leak Check After	<.005 cfm@ 10 "hg		
			after 0 = 2	
	CO2 %	0	~~after~~ 43.4 = 45.6	Big small
	O2 %	21.0		
			readout 0 = 0.0	50cc / 50 cc
	Impingers (1-3)	276	after 43.4 - 43.4	48 2.97 / 48 2.97
	Dessicant	211	10.57 liters	
		clear	24003168	25091990 / 25097000

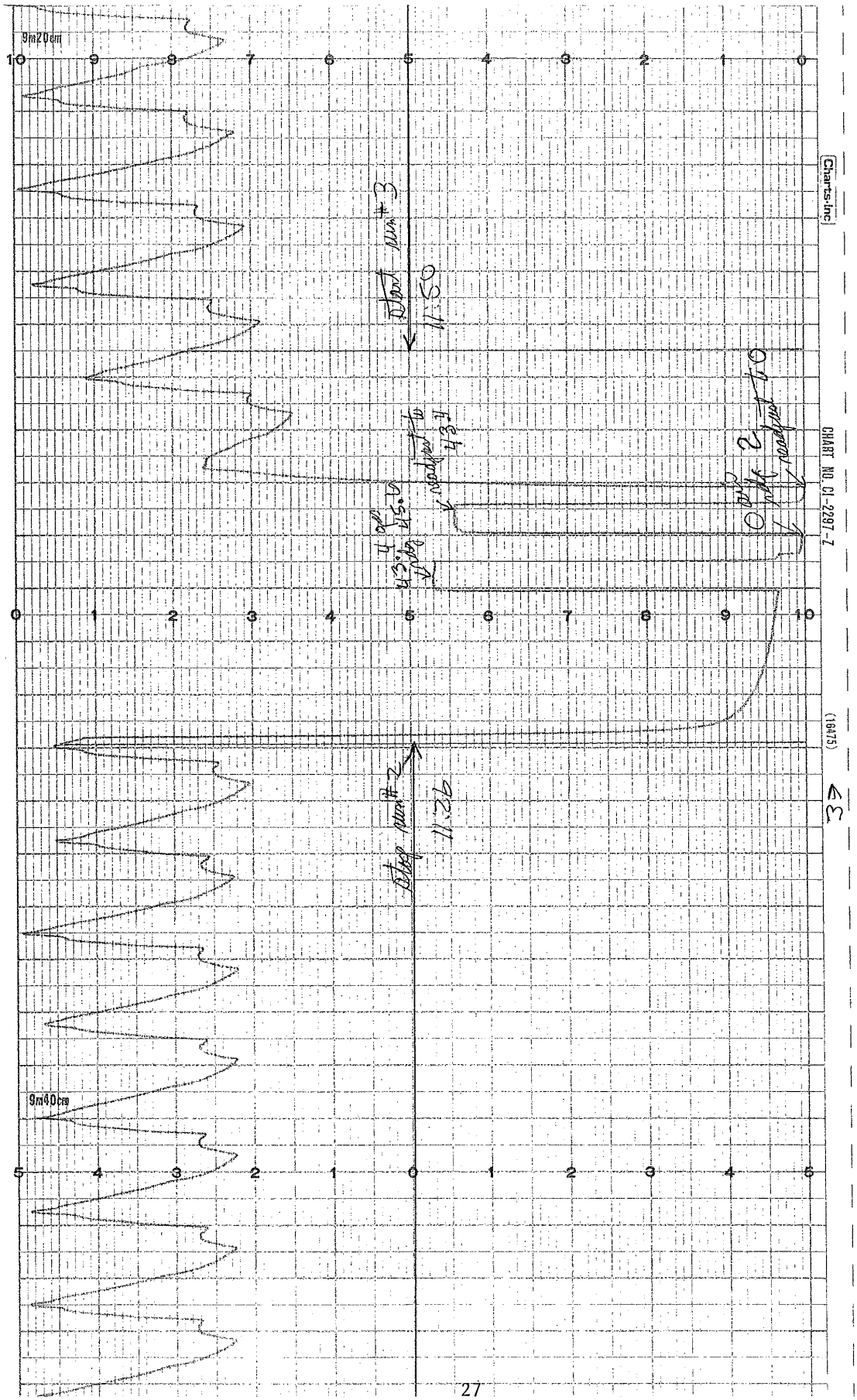
	Leak Check Before	<.005 cfm@ 15 "hg		temp 68°
	Start DGM Vol	276.805	452.687	
	Start Time	11:50	11:51	
	Stop Time	12:51	12:51	
	Stop DGM Vol	321.944	453.075	
	Leak Check After	<.005cfm@ 10 "hg		
			85.2 = 84.6	
			0 = -0.1	
	CO2 %	0	43.4 = 43.6	
	O2 %	21.0		
				Big small
	Impingers (1-3)	278	outlet	48 2.66 / 48 2.66
	Dessicant	211	10.56	40 / 40
		clear	25097016	25091993 / 25097020

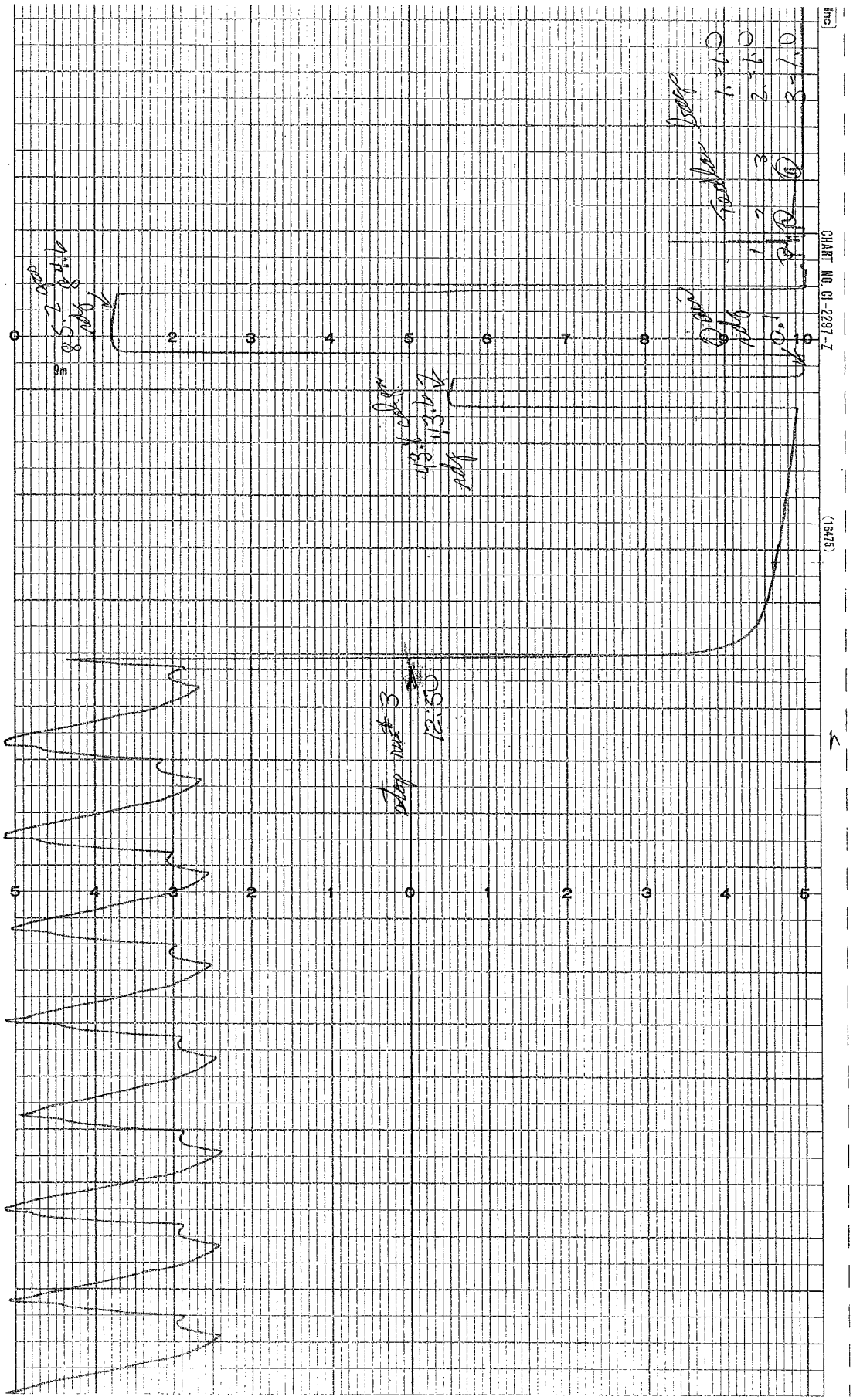
1	1.0
2	1.0
3	1.0

Methane









ANALYZER CALIBRATION DATA

Source Identification: Outlet
Test Personnel: BSD
Date: 5/4/04

Runs: 3
Span: 0-100

	Cylinder Value	Analyzer Calibration Response	Difference (% of Span)
Zero Gas	0	0	—
Mid-Range Gas	43.4	43.2	0.2%
High-Range Gas	85.2	85.2	—
Low-Range	21.3	21.6	0.3%

		Initial Values		Final Values		
	Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Run #1						
Zero Gas		0		0.1		0.1%
Upscale Gas		43.4		43.1		0.3%
Run #2						
Zero Gas		0.1		2		1.9%
Upscale Gas		43.1		45.6		2.5%
Run #3						
Zero Gas		0		0.1		0.1%
Upscale Gas		43.4		43.6		0.2%

System Calibration Bias = $\frac{\text{System Cal. Response - Analyzer Cal. Response}}{\text{Span}} \times 100$

Drift = $\frac{\text{Final System Cal. Response - Initial System Cal. Response}}{\text{Span}} \times 100$

AGA
Member of the Linde Gas Group

Linde

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:

Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:

LINDE OSHKOSH INTERBRANCH
1925 JACKSON ST
OSHKOSH WI 54903
USA
920-231-0720

Material:	12976	**Blend Tolerance:**	5 % Relative
EPA C3H8/ZERO AIR 1-99 PPM	A16	**Blend Type:**	EPA Protocol
Production #:	100104845	**Cyl. Pressure:**	2000 psig
Lot #:	02499H5020GD	**Balance Gas:**	Air
Cylinder #:	LL34412	**CGA:**	590
Expiration Date:	8/9/2008	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-98-6	Propane	85	85.2 +/- 0.9 ppm	08/09/2005
132259-10-0	Air		Balance	08/09/2005

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
7782-44-7	Oxygen	21.0 %	08/09/2005

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-98-6	Propane	CC34541 , GMIS	101.7 ppm	07/14/2007
7782-44-7	Oxygen	CC73283 , NTRM	20.89 %	10/02/2008
74-98-6	Propane	CC55107 , GMIS	10.02 ppm	06/14/2007

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	07/05/2005
Rosemount 755R	1000559	Paramagnetic	07/05/2005

All analyses are performed under controlled environmental conditions.This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jennifer Carney

Jennifer Carney

HiQ Analysis Certificate

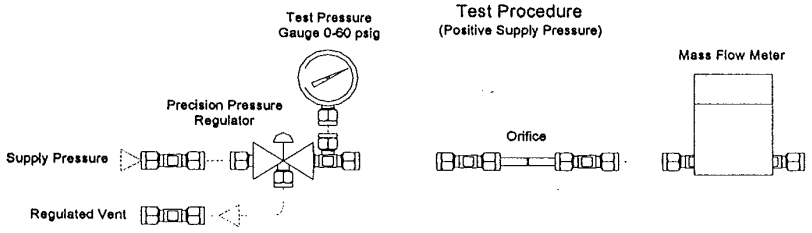
Millennium Instruments Inc.

Model 2002 Cal Gas Diluter

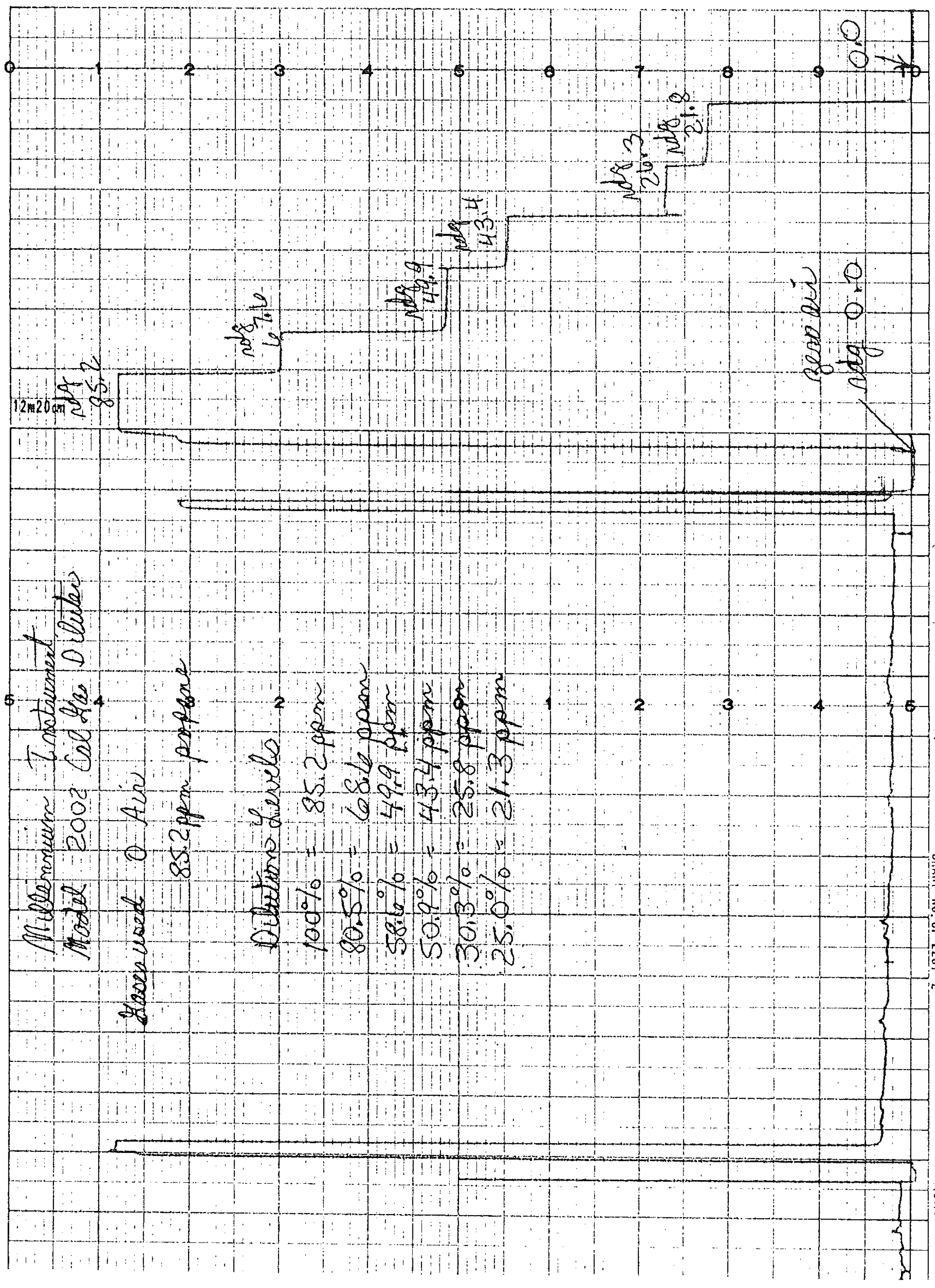
Calibration Data Sheet

Orifice Calibration Data

Orifice Label	actual dilution	Pressure 20 P.S.I.G.		
K-11 (A)		1.42		L.P.M.
K-21 (B)		5.04		L.P.M.
K-19 (25%)	25.0%	4.27		L.P.M.
K-17 (30%)	30.3%	3.26		L.P.M.
K-21 (50%)	50.9%	4.86		L.P.M.
K-17 (60%)	58.6%	3.56		L.P.M.
K-10 (80%)	80.5%	1.22		L.P.M.



P.O. Box 340 Spring Grove, Illinois 60081
Tel: 815.675.3225 / Fax: 815.675.6965
E-mail: millennium@millinst.com / WWW: www.millinst.com



ARP-Taylor01438

TYPE S PITOT TUBE INSPECTION DATA

Date: 4/3/04 Pitot Number: 4-9-03-3

Pitot tube assembly level? yes x no ____

Pitot tube opening damage? yes ____ no x
If yes explain below.

$\alpha 1$ 1 (<10 °) $\alpha 2$ 0 (<10°)

$\beta 1$ = 1 (< 5°) $\beta 2$ 1 (< 5°)

γ = 0 ° θ = 0 ° A = 0.741 cm (in)

Z = A SINE γ = 0.000 cm (in) Where Z is <0.32 cm (<1/8 in)

W = A SINE θ = 0.000 cm (in) Where W is <0.08 cm (<1/32 in)

Pa = 0.371 cm, in Pb = 0.371 cm, in

P = Pa + Pb / = 0.371 cm, in

Dt = 0.250 cm , in P/Dt = 1.482 Where P / Dp $\geq$ 1.05 and $\leq$ 1.50

Comments: Client: Badger Labs

Type of Probe and Effective 3' Replacement Pitot

Cp = 0.84

Pyrometer Calibration Sheet

Reference Calibrator
Extech Digital Thermocouple Calibrator & Thermocouple, Model 42312
Certificate of Calibration # 1000290712
Instrument # 183309
Serial # 55000093
Calibration Procedure: 33K5-4-15-1: Thermocouple Simulator Calibrator
Calibrated by: Davis Inotek Calibration Lab
Instrument has been calibrated against standards traceable to NIST

Pyrometer Calibrated: ESC M5 Console
Date Calibrated: 4/3/06
Calibrated by: bfl

Temperature Scale Used — Fahrenheit x — Celsius — Full test x — Post test

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
0°F	1 °F
50°F	50 °F
100°F	100 °F
150°F	150 °F
200°F	201 °F
250°F	252 °F
300°F	302 °F
400°F	401 °F
500°F	500 °F
600°F	600 °F
700°F	702 °F
800°F	802 °F
900°F	902 °F
1000°F	1002 °F
1250°F	1252 °F
1500°F	1501 °F
1750°F	1749 °F
1995°F	1996 °F

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	C-5000
Console Serial Number	1582
DGM Model Number	S275
DGM Serial Number	1

Calibration Conditions			
Date	Time	04/03/06	9:00
Barometric Pressure		29.00	in Hg
Theoretical Critical Vacuum[1]		13.7	in Hg
Calibration Technician		BFL	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	oR/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3*°R^{1/2})/(in.Hg*min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
5.0	3.70	905.600	911.195	68	69	31	0.8510	73	73	18.0
6.0	2.10	911.195	916.370	69	70	23	0.6610	73	73	20.0
8.0	1.40	916.370	921.992	70	70	19	0.5360	73	73	21.5
9.0	0.89	921.992	927.303	70	71	16	0.4510	73	73	22.5
13.0	0.46	927.303	932.767	71	72	11	0.3250	73	73	23.5

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
5.469	1.094	5.345	1.069	0.9774	-0.0141	1.069	1.798	0.163
5.028	0.838	4.982	0.830	0.9908	-0.0007	0.830	1.675	0.040
5.448	0.681	5.386	0.673	0.9887	-0.0028	0.673	1.691	0.055
5.135	0.571	5.099	0.567	0.9929	0.0015	0.567	1.513	-0.123
5.267	0.405	5.307	0.408	1.0076	0.0161	0.408	1.500	-0.136
				0.9915	Y Average		1.635	ΔH@ Average

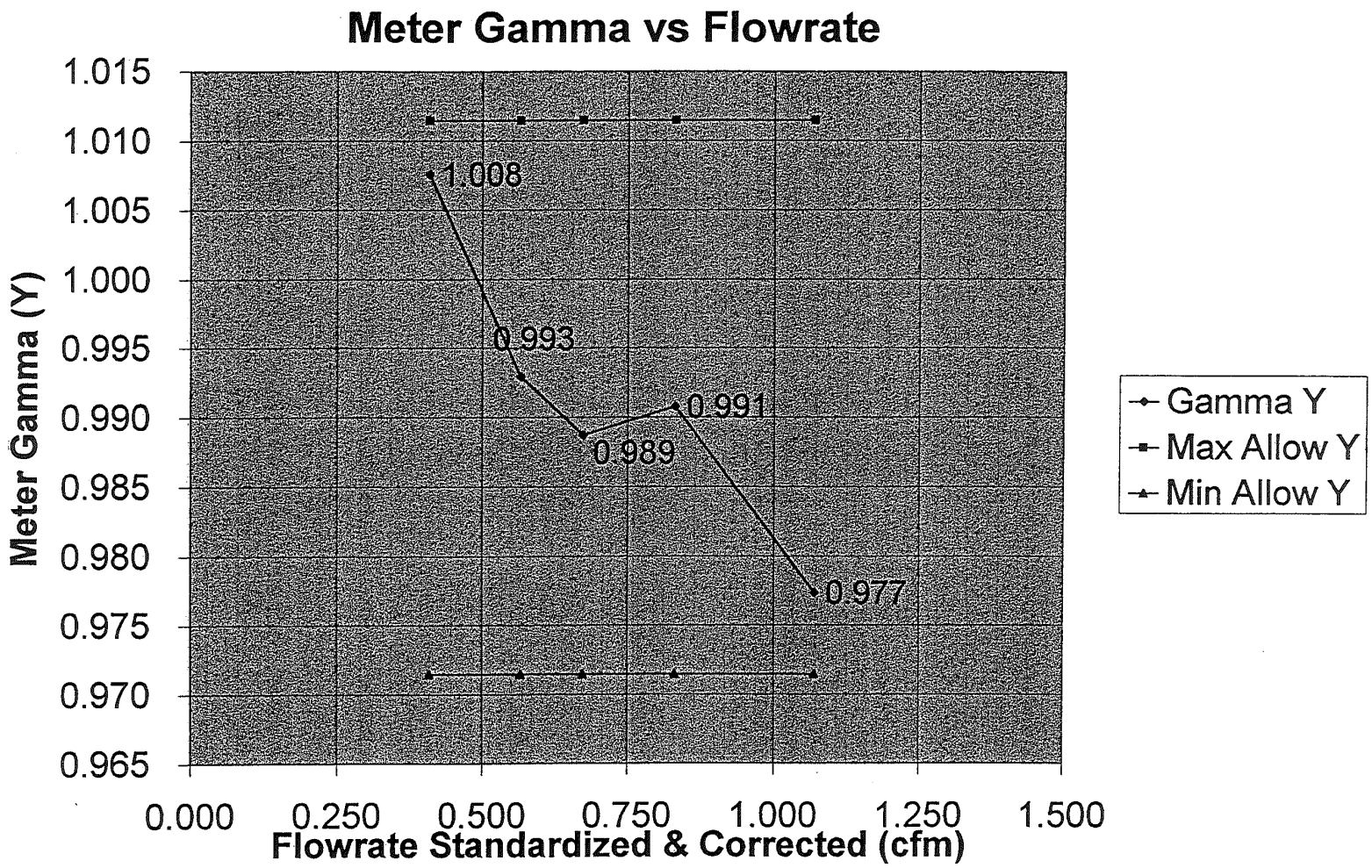
Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using Critical Orifices as Calibration Standards, the Critical Orifice Set Number 1409S was calibtrated in accordance with CFR 40, Appendix A, Method 5, Section 7.2 by Millennium Instruments Inc. on 7/6/04.

Signature Susan F. Jansen Date 4/3/06

Calibration Date: 4-3-2006

Calibration Technician: BFL

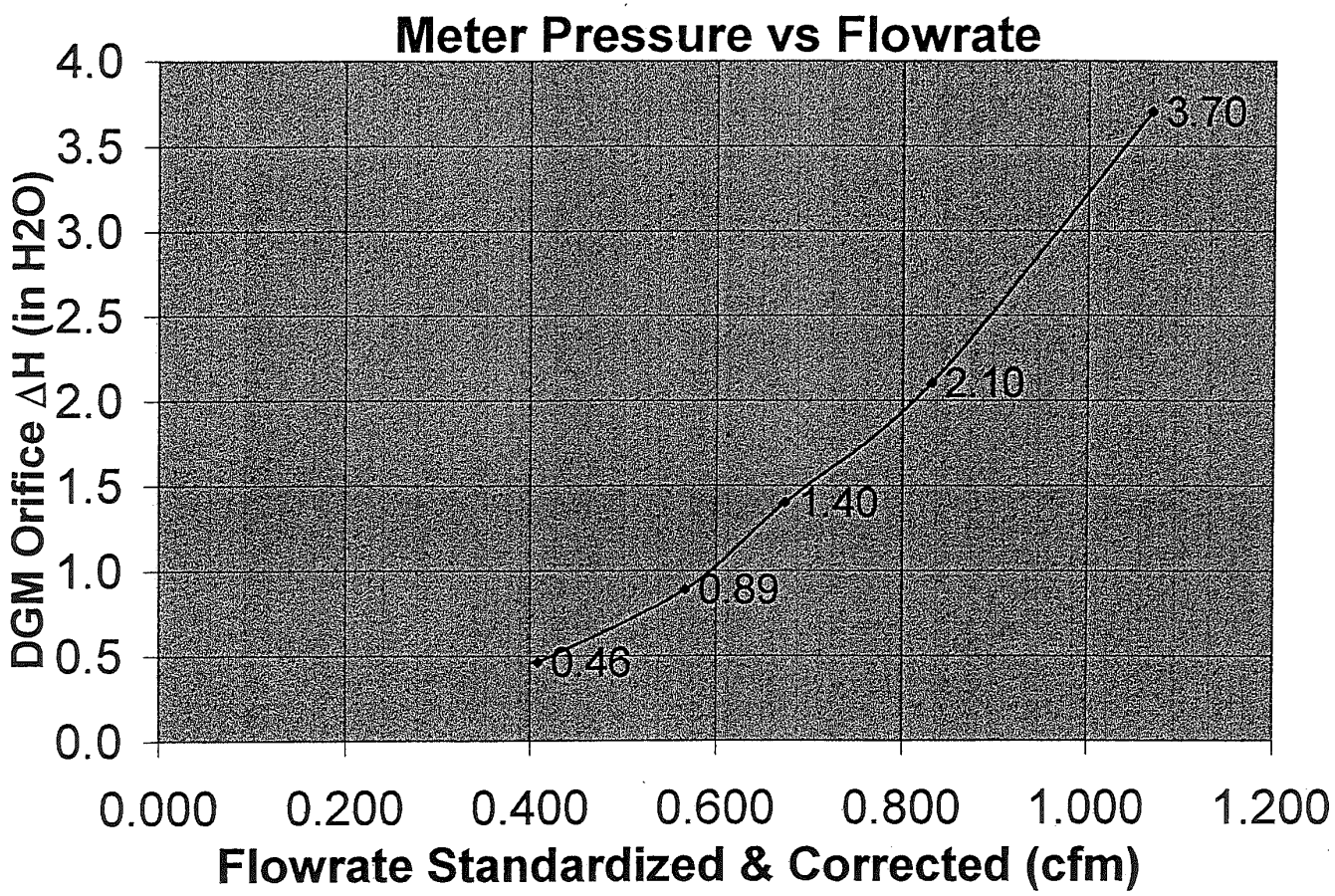


Console Serial: 1582

Console Model: C-5000

Calibration Date: 4-3-2006

Calibration Technician: BFL



Console Serial: 1582

Console Model: C-5000

BADGER LABORATORIES & ENGINEERING CO., INC.

SAMPLE RECEIPT FORM

CLIENT INFORMATION

COMPANY: Atlas Resin Proppants

NAME:

ADDRESS:

PHONE/ FAX:

P.O. #:

PROJECT/SITE:

REPORT & BILL TO:

ADDITIONAL REPORTS TO:

TURN AROUND TIME:

☐ Normal

☐ Rush (Approval _____)

SAMPLE TYPE:

☐ Groundwater
☐ Wastewater
☐ WPDES
☐ Cooling Water
☐ Drinking Water
☐ Solid Waste
☐ Oil
☒ Other Stack Tubes

☐ Lab Filtered
☐ Field Filtered
☐ Grab
☐ Composite
☐ Flow Proportional
☐ Time Proportional

Customer Sample ID	DATE REC'D	BL & E REPORT #	BL & E SAMPLE #	TEMP *	# of Containers	Ice Y/N	DELIVERY METHOD				PRESERVATION							ANALYTICAL REQUESTS	pH ok	EP
							BL&E	CLIENT	UPS	OTHER	PIF	PIL	NON-PRES	H2SO4	HNO3	NAOH	OTHER			
	5/8	4518	9906	—			X				X							Stack		
			9907	—	10		X						10					tubes for phenol		

CHAIN OF CUSTODY RECORD

FILLED IN BY CUSTOMER	FILLED IN BY BADGER LABS & ENG	
SAMPLED BY: BE	RECEIVED BY: BSO	
DATE/TIME SAMPLED:	DATE/TIME RECEIVED: 5-8-6	
RELINQUISHED BY:		

* Temperature over 4°C are above EPA/DNR Protocol unless received on ice.

* EP= If pH was not correct, extra preservation was added until correct pH was achieved.

* PIF= Preserved in field.
* PIL= Preserved in lab.

sampprct1.xls
7-1-02

BADGER LABORATORIES & ENGINEERING CO, INC

Field Sample Log Sheet - Chain of Custody Form

Client: Atlas Resin Proppants

Location: Taylor, WI

Date	Sample id	Analysis	Preservation	Comments	Tech
5/4/06	Filter-Run#1	Particulate	none		BO
	Filter-Run#2				
	Filter-Run#3				
	Filter-Blank				
	Probe Wash-Run#1		acetone		
	Probe Wash-Run#2				
	ProbeWash-Run#3				
	Acetone Blank				
	Impinger H2O-Run#1		None	story Phenol Odor	
	Impinger H2O-Run#2				
	Impinger H2O-Run#3				
	H2O Blank				
	Impinger MeCl2-Run#1		MeCl2		
	Inpinger MeCl2-Run#2				
	Impinger MeCl2-Run#3				
	MeCl2 Blank				

Sample Line MeCl2

Rel'd By	Rec'd By	Date/Time	Comments
BO	PSL	5/5/06 11:00	filter Downstream
			# 9406

LABORATORY
95 Oakwood Road Lake Zurich, IL 60047 **(847) 726-3320**
Fax (847) 726-3323 Toll Free (888) 576-7522
www.choosebroadspire.com

BROADSPIRE
A PLATINUM EQUITY COMPANY

ANALYSIS REQUEST

Name _____
Firm Badger Labs
Address _____

Phone No. _____
Fax No. _____
Email _____

No. 451238

RUSH SERVICE
Contact Lab to Arrange Priority Analysis
Date Requested By __/__/__
Add'l Charges Approved _____ *(initials)*

FIELD NUMBER	SAMPLING VOLUME (Sampling times for diffusion monitors)	ANALYZE FOR --	LAB # (Internal Use Only)	COMMENTS
25096982	11.83 Diffuse	Phenol		BLtc Sub # 99804518
24003168	10.57			
25097016	10.51			
23005601	3.18			
25096990	2.97			
25096993	2.16			
25096983	3.03			
25097000	2.97			
25097020	2.16			
Blank 24019667	None			

Billing Information/Comments:

Billing Method: ☒ Purchase Order (# 14343) ☐ Direct Bill
☐ Credit Card # _____ Expires __/__

Reference methods subject to modifications. Contact laboratory for specifics.
Submission of samples constitutes acceptance of warranty policy printed in the current fee schedule.

Chain of Custody Signature:

B# _____ F# _____			
Sampler Bruce Tanner	Shipper BSO	Lab Receiving	
Date 5/6/16	Date 5-7-16	Date	
Time 13:00	Time 1500	Time	

☐ *Samples received in acceptable condition for analysis.* ☐ *Supplemental report attached documenting specific deficiencies.*

NC 82-12 20M 10-04

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522
www.natlsco.com

Laboratory Analysis Report

TO: BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAY 11, 2006
SAMPLES REC'D MAY 09, 2006
REQUEST NUMBER 451238
PAGE NUMBER 1 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
25096982	11.83 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front 940, Back < 5.0 Parts Per Million: Front 21, Back < 0.11	MAY 11, 2006
24003168	10.57 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front 1000, Back < 5.0 Parts Per Million: Front 25, Back < 0.12	MAY 11, 2006
25097016	10.56 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front 1100, Back < 5.0 Parts Per Million: Front 27, Back < 0.12	MAY 11, 2006
23005601	3.18 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front < 5.0, Back < 5.0 Parts Per Million: Front < 0.41, Back < 0.41	MAY 11, 2006

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Director Environmental Health Services
Environmental Sciences Laboratory

NATLSCO Risk & Safety Services
A Bureau Veritas Company

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522
www.natlsco.com

Laboratory Analysis Report

TO: BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAY 11, 2006
SAMPLES REC'D MAY 09, 2006
REQUEST NUMBER 451238

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
25096990	2.97 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front 680, Back < 5.0 Parts Per Million: Front 60, Back < 0.44	MAY 11, 2006
25096993	2.66 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front 810, Back < 5.0 Parts Per Million: Front 79, Back < 0.49	MAY 11, 2006
25096983	3.03 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front < 5.0, Back < 5.0 Parts Per Million: Front < 0.43, Back < 0.43	MAY 11, 2006
25097000	2.97 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front < 5.0, Back < 5.0 Parts Per Million: Front < 0.44, Back < 0.44	MAY 11, 2006

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Director Environmental Health Services
Environmental Sciences Laboratory

NATLSCO Risk & Safety Services
A Bureau Veritas Company

Industrial Hygiene Laboratory
95 Oakwood Road
Lake Zurich, IL 60047
Phone (847) 726-3320
Fax (847) 726-3323
Toll Free (888) 576-7522
www.natlsco.com

Laboratory Analysis Report

TO: BRUCE LAMERS
BADGER LABS & ENG
501 WEST BELL STREET
NEENAH, WI 54956
USA

REPORT DATE MAY 11, 2006
SAMPLES REC'D MAY 09, 2006
REQUEST NUMBER 451238
PAGE NUMBER 3 OF 5

SAMPLE	AIR VOLUME / ANALYSIS REQUESTED	MEDIA TYPE / RESULTS	ANALYZED DATE
25097020	2.66 Liters PHENOL (DE = 82%)	XAD-7 Tube Micrograms: Front < 5.0, Back < 5.0 Parts Per Million: Front < 0.49, Back < 0.49	MAY 11, 2006
24019667	PHENOL (DE = 82%)(BLANK)	XAD-7 Tube Micrograms: Front < 5.0, Back < 5.0 NONE DETECTED	MAY 11, 2006

COMMENTS:

IF PRESENT, DE MEANS DESORPTION EFFICIENCY

Respectfully submitted,

William M. Walsh, CIH, ROH
Director Environmental Health Services
Environmental Sciences Laboratory

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BUREAU VERITAS 1828

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REPORTING LIMIT	ANALYSIS REQUESTED	METHODOLOGY	CAS #
5 Micrograms	PHENOL XADG	NIOSH 2546 GAS CHROMATOGRAPHY	108-95-2

COMMENTS:

* CONCENTRATION CALCULATED USING AIR VOLUMES SUPPLIED BY CLIENT
* UNLESS OTHERWISE NOTED, SAMPLES RECEIVED IN GOOD CONDITION
* MODIFICATIONS MAY BE MADE TO ABOVE METHODS TO OPTIMIZE RESULTS
* RESULTS ARE STRICTLY LIMITED TO SAMPLES ANALYZED

Respectfully submitted,

William M. Walsh, CIH, ROH
Director Environmental Health Services
Environmental Sciences Laboratory

NATLSCO Risk & Safety Services
A Bureau Veritas Company

ACCREDITED BY THE AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

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REQUEST NUMBER 451238
PAGE NUMBER 5 OF 5

	REQUEST CLIENT COMMENTS:	
	REQUEST LAB COMMENTS:	REF: PO # 14343. UNLESS OTHERWISE NOTED, ALL QC CRITERIA WERE MET.

Respectfully submitted,

William M. Walsh, CIH, ROH
Director Environmental Health Services
Environmental Sciences Laboratory

NATLSCO Risk & Safety Services
A Bureau Veritas Company

Atlas Resin Proppants - Enviromental Controls Inspection data

Date: 5/4/06

Time	Pres Diff " wc	pH	Flow#1 gpm	Flow#2 gpm	Solids NTU's	Notes
7:30	17	10.43	51	47	355	Baseline, morning measurement
9:00	15.5	10.4	51	56		Start of Stack Test
9:30	16	10.38	51	57	516	
10:00	16	10.4	51	54		
10:30	16	10.37	51	47		
11:00	16	10.35	51	45	470	
11:30	16	10.34	51	44		
12:00	16	10.34	51	44		
12:30	16	10.28	51	44	441	
13:00	16	10.31	51	44		End of Stack Test

CHEMISTS
ENGINEERS

BADGER LABORATORIES & ENGINEERING INC.
501 WEST BELL STREET • NEENAH, WISCONSIN 54956-4868 • EST. 1966
(920) 729-1100 • FAX (920) 729-4945 • 1-800-776-7196

April 26, 2006

Mike Ross
Wisconsin Department of Natural Resources
La Crosse Service Center
3550 Mormon Coulee Road
Room 104
La Crosse, WI 54601

Dear Mr. Ross:

The following data is submitted regarding the source test plan of sampling for Particulate, Volatile Organic Compounds (VOC) and Phenol emissions to be followed at Atlas Resin Proppants. The facility is located north of Taylor, WI, off County Road P in Jackson County. The testing is being performed to demonstrate compliance with Wisconsin Department of Natural Resources (WDNR) Air Pollution Control Construction Permit No. 05-JAJ-015 limitations for Particulate, VOC and Phenol emissions. The testing is scheduled for approximately 9:00 A.M. on May 4, 2006. The Atlas Resin Proppants contact is Mr. Robbie Sage (phone #715-662-2200).

The emissions test will be run by Mr. Bruce Lamers who has more than fifteen years experience in stack emission testing.

Applicable methods for Particulate testing are EPA Methods 5 and 202. The sampling equipment for the Particulate testing consists of a Millennium Instruments Mill-5 stack sampler. A schematic of the sampling train is included as Figure 5. A Hayes Orsat Analyzer will be used for determining the gas stream molecular weight.

The sampling and analysis for VOC will follow EPA Method 25A. The testing will be performed concurrent with the Particulate emission tests. A heated Teflon line will be used to transport the sample from the sampling points to the analyzers. ~~Two~~ J.U.M. model 3-100 total hydrocarbon analyzers, with a heated detector, will be used for ~~simultaneous~~ VOC analysis on the ~~inlet and~~ outlet. The analyzers will be calibrated with zero air and EPA Protocol propane calibration gases. Each test will be for a one hour duration. A strip chart recorder will be used to provide a permanent record of the results. The methane concentration will be determined from an integrated bag sample taken each test and subtracted from the total hydrocarbon concentration. This will be performed by placing a charcoal tube between the bag and analyzer.

The permit allows compliance determination for Phenol to be either a control efficiency of 64% for VOC emissions across the scrubber, or control efficiency of 64% for Phenol emissions across the scrubber. The compliance determination for Phenol will be based on control efficiency of 64% for Phenol emissions. This will be performed by testing the two inlet ducts before the scrubber and on the outlet. The testing will follow NIOSH Method 2546 as recommended in the permit.

The emission test will consist of three repetitions of these methods. The arithmetic mean of the test results will be supplied as well as all raw data from each test run. The testing procedure is summarized as follows:

1. Determine sample points and initial velocity traverse.
2. Velocity, temperature and flow rate measurements.
3. Moisture and molecular weight determination.
4. Particulate, Phenol and VOC testing.
5. Sample recovery and Analysis.
6. Calculations and report.

The outlet sampling ports lie in a straight section of twenty-four inch diameter stack, more than eight diameters downstream and more than two diameters upstream of any flow disturbance. Sampling time will be determined after initial velocity measurements are made. A minimum sampling time of one hour will be used to obtain at least 30 cubic feet through the dry gas meter for the Particulate tests. Twelve points will be used for the Particulate sampling.

The inlet sampling location for the Phenol testing will be in two separate ducts prior to entry of the scrubber. Due to the duct configuration, both inlet ducts will have to be sampled to obtain a total inlet loading. Sample port location will conform to EPA Method 1 specifications. Air flows will be determined on the larger inlet duct from the Batch Mixer. The air flows will be determined according to EPA Methods 1-4. The air flow from the second inlet duct will be the difference of the scrubber outlet and inlet duct from the Batch Mixer.

The testing is to be performed on the discharge of a sand resin coating process (P51). Heated sand and flake resins, with a small amount of additives are mixed in the Batch Mixer. An aqueous hexamethylenetetramine solution is added to the Batch Mixer to cross-link the melted flake resin and begins cooling the coated sand. Each Batch Mix is 2,500 pounds. There are 11 batches per hour. During the emission test the process will be operated at this rate. Each batch is discharge into a Continuous Mixer (P52) which is designed to keep the process flowing as discrete particles until the product has cooled. The Continuous Mixer converts the batch process into a continuous process.

There is a wet scrubber (C50) that is used to control emission from this source. The wet scrubber also controls emissions from (P53, P54, T31, T32).

Process data required during the testing will be collected by Atlas Resin Proppants personnel. The process data will include number of batches, pressure drop across the wet scrubber, liquor flow rate to scrubber and pH of wet scrubber absorbing fluid.

The Particulate emission limitation is 1.5 pounds per hour. The VOC limitation is 10.6 pounds per hour or 64% control efficiency across the scrubber. The Phenol limitation is either 64% VOC control efficiency across the scrubber or 64% Phenol control efficiency across the scrubber.

Please call me at 920-729-1100 or 800-776-7196 if you have any questions.

Very truly yours,

BADGER LABORATORIES & ENGINEERING
WDNR Certified Lab No. 445023150

Bruce F. Lamers
Project Manager

cc: Mr. Robbie Sage
Atlas Resin Proppants

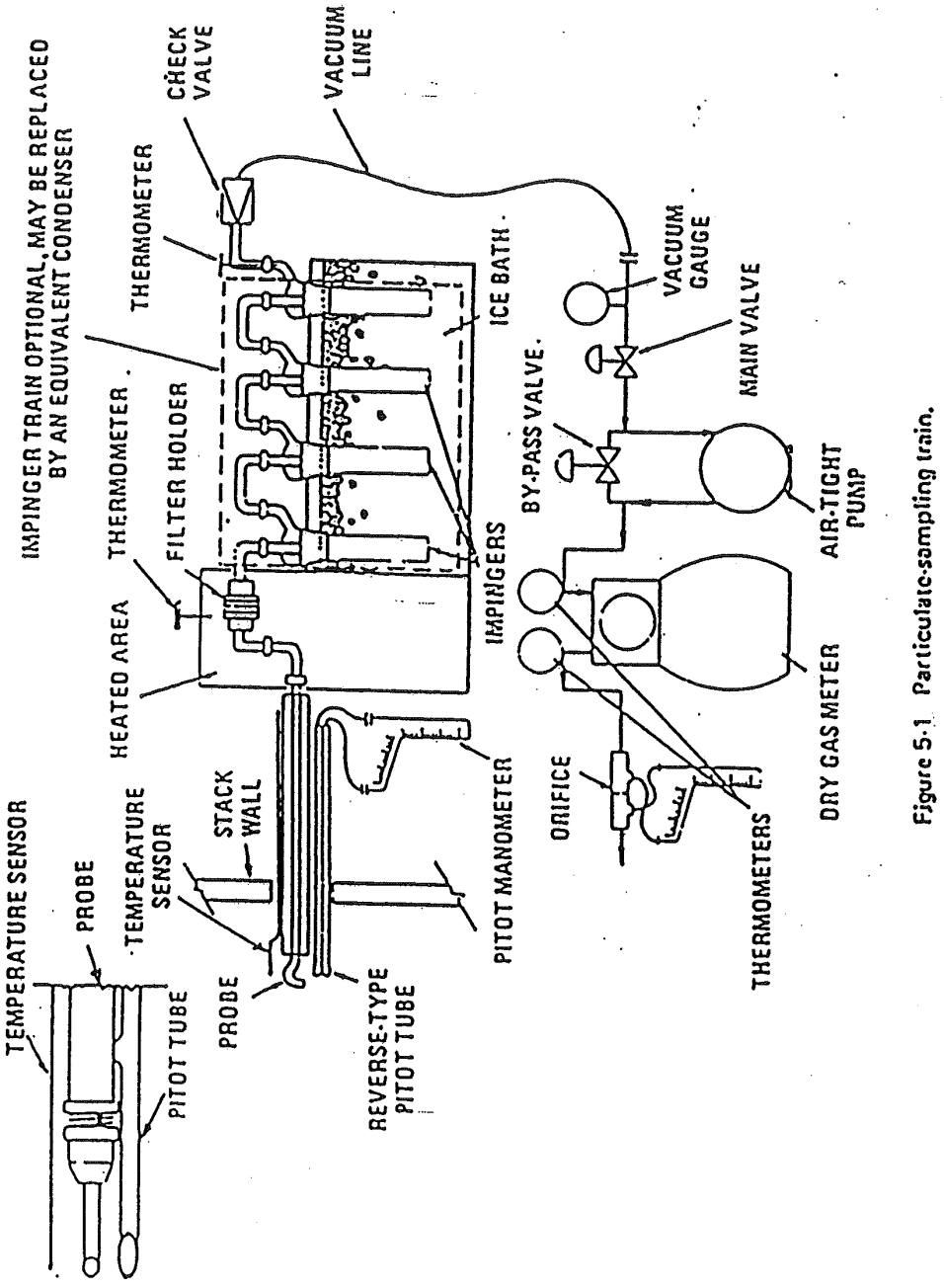
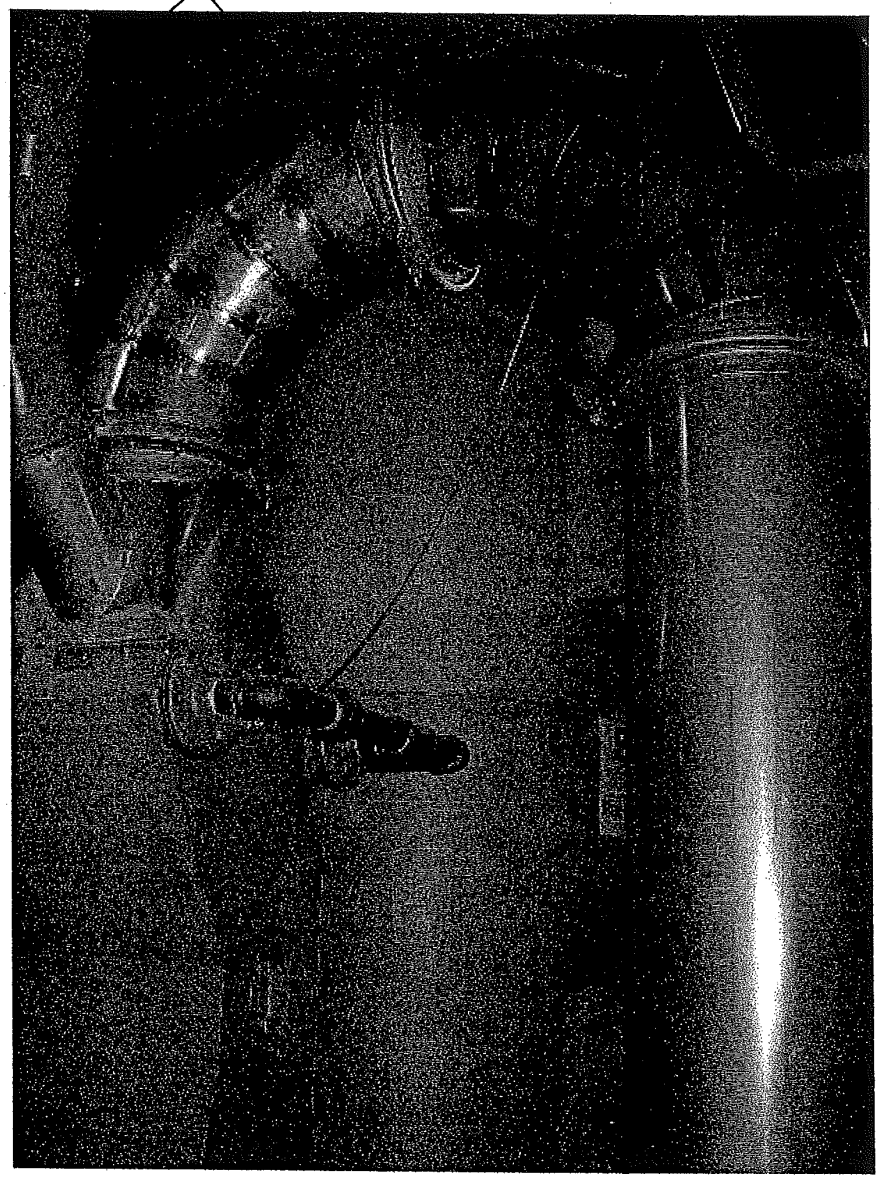


Figure 5-1 Particulate-sampling train.

inlet ducts - 2



Outlet Stack